

3.0 TRANSPORTATION

This chapter describes the existing transportation services and facilities within the study area for the proposed LYNX Blue Line Extension Northeast Corridor Light Rail Project (LYNX BLE), outlines the programmed and planned improvements, and assesses future travel growth and its impact on the corridor. The transportation and traffic impacts of alternatives that were evaluated are summarized.

3.1 Affected Environment

Affected Environment describes the existing (2008/2009) and projected (2030) transportation conditions in the Northeast Corridor, without implementation of a major transit investment. These transportation conditions are described in terms of travel patterns, public transit service, street and highway facilities, freight and passenger rail service and bike and pedestrian facilities.

3.1.1 Travel Patterns

Travel patterns refer to the number and type of trips made between different portions of the region as a result of the distribution of population and employment. These travel patterns are grouped by the trip interactions between “centers,” “corridors” or “wedges,” as defined in the *Centers, Corridors and Wedges Growth Framework*, Draft 2010. Corridors are the five primary travel and growth areas that extend from Center City Charlotte (central business district or CBD) outward to the edge of its jurisdiction. There are five corridors: North, Northeast, South, Southeast and West. Wedges are those areas situated between the five principal transportation corridors. Travel patterns are described in two ways: by purpose and orientation and by mode.

3.1.1.1 Travel by Purpose and Orientation

Travel by purpose identifies the intent behind an individual’s trip. Orientation identifies the origin and destinations of that trip. For this study, trip purpose is classified as trips from home to work, from home to university, from home to other locations, and non-home based. Travel orientations have been defined to include trips from different parts of the study area to Center City Charlotte, between transit corridors, within the Northeast corridor and to the Concord/Kannapolis area. All remaining trips are those between other parts of the Charlotte area traveling through the study area and are defined as other trips.

Based on regional travel demand forecasts, all purpose travel in the Charlotte region is projected to increase approximately 58 percent for both peak period trips (morning and afternoon rush hours) and total daily trips from 2009 to 2030. Similarly, the Northeast Corridor is projected to increase approximately 53 percent for both peak period trips and total daily trips. The percent of trips by purpose in 2030 is expected to be 16 percent work trips, 45 percent home-based other trips, 38 percent non-home based and one percent home-based university trips. Table 3-1 summarizes the travel patterns within the Northeast Corridor in 2009 and 2030.

Table 3-1
Study Area Daily Trips by Purpose and Orientation, 2009 and 2030

Travel Orientation	2009 Person-trips					2030 Person-trips				
	Total HBW ¹	Total HBO ²	Total NHB ³	Total HBU ⁴	Total	Total HBW ¹	Total HBO ²	Total NHB ³	Total HBU ⁴	Total
Travel to CBD										
NE to CBD	11,231	15,007	10,379	169	36,786	13,436	20,615	16,029	419	50,499
East wedge to CBD	18,650	15,285	7,631	346	41,912	22,193	18,482	10,151	713	51,539
North/NE wedge to CBD	9,270	11,759	5,311	152	26,492	10,319	13,083	8,005	329	31,736
Concord/ Kannapolis to CBD	5,833	705	717	2	7,257	5,323	1,008	841	7	7,179
Subtotal	44,984	42,756	24,038	669	112,447	51,271	53,188	35,026	1,468	140,953
Travel to/from Corridors										
NE to/from South Corridor (SC)	3,920	3,758	3,508	16	11,202	3,985	5,039	4,731	25	13,780
NE to/from North Corridor	884	1,858	2,876	0	5,618	1,453	5,148	5,929		12,532
NE to/from SE Corridor	4,148	17,607	10,353	10	32,118	4,531	19,649	13,476	15	37,671
NE to/from West Corridor	2,251	2,667	3,313	6	8,237	3,242	3,666	4,904	10	11,822
North/NE wedge to/from South Corridor	3,787	3,623	2,398	12	9,820	3,569	3,919	3,203	15	10,706
NE to/from East Wedge	2,873	20,061	16,977	21	39,932	4,055	24,330	24,433	27	52,845
NE to/from South Wedge	1,993	4,151	2,642	2	8,788	1,601	4,497	3,089	2	9,189
NE to/from Concord/ Kannapolis	2,527	10,874	13,078	2	26,481	4,467	21,251	23,320	6	49,044
Subtotal	22,383	64,599	55,145	69	142,196	26,905	87,499	83,085	100	197,589
Within NE Corridor	14,028	63,482	67,947	5,477	150,934	25,775	91,324	108,074	7,248	231,921
NE Corridor Related Trips (excluding CBD)	111,478	272,153	247,207	15,858	646,734	161,533	382,769	377,598	22,197	944,098
All other Travel, Region	1,241,749	3,560,255	2,973,991	54,275	7,830,269	1,995,892	5,556,000	4,704,629	83,621	12,340,142
Region Total	1,255,777	3,623,737	3,041,938	59,752	7,981,204	2,021,167	5,647,324	4,812,703	90,369	12,571,563

¹ Home Based Work, ² Home Based Other, ³ Non Home Based, ⁴ Home Based University

Source: AECOM and Metrolina Regional Travel Demand Model

3.1.1.2 Regional Travel by Mode

Daily person-trips forecast by mode for 2009 and the 2030 No-Build Alternative are shown in Table 3-2. The table presents the number and percentages of work and non-work trips predicted to be made in 2030 on transit and highways, categorized by mode of access.

Table 3-2
Regional Daily Person-Trips by Mode, 2009 and 2030

Purpose and Mode	2009 Person-Trips		2030 Person-Trips No-Build Alternative	
	Person-Trips	Percent of Total	Person-Trips	Percent of Total
Transit Person-Trips				
Walk to Transit	37,196	74.0%	65,526	78.9%
Drive to Transit	10,344	20.6%	13,989	16.9%
Drop-off to Transit	2,685	5.4%	3,525	4.2%
Highway Person-Trips				
<i>Work Trips</i>				
Drive Alone	1,122,240	14.4%	1,804,043	14.7%
Carpool 2	75,931	1.0%	121,013	1.0%
Carpool 3+	22,998	0.3%	36,275	0.3%
<i>Non-Work Trips</i>				
Drive Alone	3,665,796	47.0%	5,753,523	46.9%
Carpool 2	1,789,707	22.9%	2,803,417	22.8%
Carpool 3+	1,124,959	14.4%	1,759,426	14.3%
Total Transit Person-Trips	50,255	0.6%	83,041	0.7%
Total Highway Person-Trips	7,801,630	97.8%	12,277,696	99.3%
Total Non-Motorized Person-Trips (Walk/Bike)	129,319	1.6%	210,826	1.7%
Total Person-Trips	7,981,204		12,571,563	

Source: AECOM and Metrolina Regional Travel Demand Model

3.1.2 Public Transit Service

Charlotte Area Transit System (CATS) is currently the only public transit service provider that operates within the Northeast Corridor. CATS operates a total of 77 fixed routes, including the LYNX Blue Line light rail transit service, the Charlotte Trolley, local and express fixed bus routes, and community and neighborhood shuttle service to neighborhoods and business parks. CATS also operates vanpool and paratransit service. Collectively, CATS transports more than 18 million passengers annually.

The existing LYNX Blue Line light rail operates service from 7th Street in Center City Charlotte to the I-485/South Boulevard Station near the town of Pineville. The light rail serves 15 stations, including six walk-up stations and seven stations with park-and-ride facilities. The light rail currently operates between the hours of 5:25 a.m. and 1:12 a.m.

The Charlotte Trolley is currently operated by CATS. This service traverses a portion of the existing LYNX Blue Line tracks from Tremont Avenue to 9th Street with 11 stops from Atherton Mill to 9th Street. Due to budgetary constraints, CATS discontinued regularly scheduled trolley service, effective July 1, 2010.

CATS fixed route bus service includes: 54 local and crosstown bus, neighborhood and community shuttles; 13 express routes that serve Mecklenburg County; and 8 regional express bus routes that provide service from Mecklenburg County to surrounding counties. These services primarily originate from the main transit hub known as the Charlotte Transportation Center.

The Charlotte Transportation Center is located in Center City Charlotte between Trade Street and East 4th Street next to the existing LYNX Blue Line light rail. The Charlotte Transportation Center provides a location for transfer opportunities between bus routes, as well as a direct connection to the light rail.

CATS provides additional transfer opportunities at three community transit centers, located outside of Center City Charlotte: Rosa Parks Place Community Transit Center, Eastland Community Transit Center and South Park Community Transit Center.

3.1.2.1 Fleet Characteristics

CATS currently operates a fleet of 403 buses (*CATS Bus Fleet Management Plan*, May 2009) and 20 light rail vehicles. The bus fleet consists of 173 forty-foot Local Buses (low and high floor), 91 forty-foot Suburban Style Express Buses, 40 thirty-foot Shuttle buses, 20 rubber-wheeled Trolley Buses and 85 Special Transportation Cutaway Vans for paratransit service.

The CATS fleet is currently maintained in three separate maintenance facilities. The South Tryon Bus Facility is the principal bus operations and maintenance facility with the capacity to store and maintain 250 buses. The Davidson Street Bus Facility is CATS' secondary bus facility with a capacity of 200 buses. The South Boulevard Light Rail Facility is the principal light rail storage facility and provides heavy and light maintenance services for up to 20 light rail vehicles.

3.1.2.2 Service Area Coverage

As of January 2009, 16 bus routes operate within the Northeast Corridor study area, with eight local bus routes, three University of North Carolina Charlotte shuttle routes, two neighborhood circulator routes and three express routes. The routes are described in the following and illustrated graphically in Figure 3-1.

- **Route 3** – Plaza Road. This route provides service along North Davidson Street and The Plaza from Center City Charlotte to Central Piedmont Community College (CPCC) – CATO Campus. The route serves NoDa and Hampshire Hills neighborhoods, and the University Commercial Place.
- **Route 4** – Country Club. This route serves the Villa Heights, Plaza Hills, Plaza Midwood, and Country Club neighborhoods from Center City Charlotte. The route utilizes 7th Street, Parkwood Avenue and Matheson Avenue.
- **Route 11** – North Tryon. This route provides service along North Tryon Street/US-29 from Center City Charlotte to the UNC Charlotte main campus. The route serves neighborhoods, commercial and business complexes, the Sugar Creek Service Center and the University City Municipal Service District along North Tryon Street/US-29.
- **Route 13** – Nevin Road. This route provides service from Center City Charlotte to Nevin Road, primarily operating along North Tryon Street/US-29, Statesville Avenue, and Nevin Road. The route serves various neighborhoods and businesses, as well as the Nevins Center.
- **Route 22** – Graham Street. This route provides service along North Graham Street and Mallard Creek Road from Center City Charlotte to W.T. Harris Boulevard and the University Research Park. The route serves various neighborhoods along North Graham Street, as well as apartment complexes like the Prosperity Creek Apartments. The route also serves employment destinations within the University Research Park, including the Mecklenburg County 311 Call Center.
- **Route 23** – Shamrock Drive. This route provides service between the NoDa neighborhood and East Towne Market. The route operates from Center City Charlotte via North Davidson Street, Shamrock Drive, W.T. Harris Boulevard and Hickory Grove Road.
- **Route 29** – UNC Charlotte/South Park. This route provides local crosstown service between the South Park Community Transit Center and the UNC Charlotte main campus. The route serves destinations such as South Park Mall, Cotswold Shopping Center, Eastland Community Transit Center, the CPCC CATO Campus, before terminating at the UNC Charlotte Main Campus. The route utilizes North Sharon Amity Road, The Plaza, W.T. Harris Boulevard and University City Blvd./NC-49.
- **Route 39** – Eastway Drive. This route provides service from Center City Charlotte to the Northpark Mall and Eastway Shopping Center, via Central Avenue, Eastway Drive and North Tryon Street/US-29. The route also serves the Presbyterian Hospital and CPCC Main Campus.
- **Route 47** – UNC Charlotte Nugget Shuttle. This shuttle route operates within the UNC Charlotte campus, providing students a mode to travel between dormitories and classrooms.
- **Route 49** – UNC Charlotte Niner Shuttle. This shuttle route operates within the UNC Charlotte campus, providing students a mode to travel between dormitories and classrooms.

- **Route 50** – UNC Charlotte - Charlotte Research Institute (CRI) Shuttle. This shuttle route operates within the UNC Charlotte campus, providing students a mode to travel between dormitories, classrooms and the UNC Charlotte CRI Campus.
- **Route 54x** – University Research Park. This is an express bus route serving Center City Charlotte and the University Research Park. The route utilizes Trade Street, Interstate 77 (I-77), Interstate 85 (I-85), City Boulevard, serving the CATS JN Pease Place Park-and-Ride, University Research Park and the Wachovia Customer Information Center (CIC) campus. The route operates express between Trade/Cedar Streets and I-85/City Boulevard.
- **Route 80x** – Concord Express. This is an express plus bus route serving the Center City Charlotte, various park-and-ride lots along North Tryon Street/US-29 and the City of Concord. There are four park-and-ride lots along the route: University Place Park-and-Ride in Charlotte, and the Lowe's Motor Speedway, Big Lots Shopping Center, and the Target/Home Depot Shopping Center Park-and-Rides in the City of Concord. The route operates express and does not stop between Center City Charlotte and University Place Park-and-Ride.
- **Route 81x** – Wachovia CIC Express Shuttle. This is an express bus route serving Center City Charlotte and the Wachovia CIC Campus in the University Research Park area. The route utilizes I-77 and I-85, operating express with no stops between Center City Charlotte and the Wachovia CIC Campus.
- **Route 204** – LaSalle. This route is a neighborhood circular route serving Oakview Terrace, the Rosa Parks Place Community Transit Center, the Lincoln Heights and Druid Hills neighborhoods, and the Sugar Creek Service Center. The route utilizes local neighborhood streets, LaSalle Street, Statesville Avenue, Norris Avenue, 30th Street, North Tryon Street/US-29, Craighead Road, Glory Street and West Sugar Creek Road before terminating at the Sugar Creek Service Center.
- **Route 211** – Hidden Valley. This route is a neighborhood circular route serving the Hidden Valley neighborhood and the Sugar Creek Service Center. The route utilizes North Tryon Street/US-29, West Sugar Creek Road, Tom Hunter Road and local neighborhood streets.

3.1.2.3 Operating Characteristics

CATS operates more frequent headways during the weekday peak periods and less frequent headways during off-peak hours and the weekends. Headways for all 16 routes operating within the Northeast Corridor vary in both the peak and off-peak periods. To determine a standard headway for these periods, the average of the individual headway for a particular route within these periods was rounded to the nearest five-minute interval time. The standard headways for each route are presented in Table 3-3.

Table 3-3
Operating Characteristics for Routes Serving the Northeast Corridor, 2008

Route Number	Route Name	Type of Route	Peak Headway (minutes)	Off-Peak Headway (minutes)
3	Plaza Road	Local	20	40
4	Country Club	Local	20	35
11	North Tryon/Sugar Creek	Local	10	25
13	Nevin Road	Local	30	30
22	Graham Street	Local	35	40
23	Shamrock Drive	Local	20	40
29	UNC Charlotte/South Park	Local	60	60
39	Eastway Drive	Local	35	45
47	UNC Charlotte Nugget Shuttle	Shuttle	10	15
49	UNC Charlotte Niner Shuttle	Shuttle	10	15
50	UNC Charlotte CRI Shuttle	Shuttle	15	25
54x	University Research Park	Express	10	n/a
80x	Concord Express	Express	15	n/a
81x	Wachovia CIC Shuttle	Express	60	n/a
204	LaSalle	Neighborhood	30	60
211	Hidden Valley	Neighborhood	20	25

n/a – Not Applicable; route operates only in peak period

3.1.2.4 Fare Structure

CATS offers a variety of fares for services structured by rider characteristic and the service provided. One-way fares (based on October 2008 rates) for local bus trips and on the LYNX Blue Line are \$1.50; \$.60 for neighborhood and community shuttles; \$2.00 for Express routes within Mecklenburg County and \$3.00 for Express Plus routes to neighboring counties. CATS also offers round-trip, one-day, weekly, monthly and 10-ride passes. Discounted fares are available for Youth/Students (grades K-12), persons with disabilities and seniors (age 62+).

3.1.2.5 Ridership

CATS fixed route transit services provided transit service to over 22 million passengers in FY 2008 and over 25 million passengers in FY 2009 a ridership increase of 12.5 percent. The success of the LYNX Blue Line light rail (established November 26, 2007) contributed to this ridership increase. Between November 26, 2007 and June 30, 2008 the LYNX Blue Line carried 2.9 million passengers and during FY 2009 the line carried over 5 million passengers.

Two of the Northeast Corridor routes are ranked in the top ten of CATS system-wide routes with respect to average ridership, Route 11 – North Tryon/Sugar Creek and Route 23 – Shamrock Drive. In FY 2008, routes in the northeast corridor served a total of 4.9 million passengers, which increased to 5.2 million passengers in FY 2009; overall ridership in the corridor increased by 5.2 percent between FY 2008 and 2009. The Northeast Corridor also experienced a slightly higher rate of growth compared to the total CATS bus system ridership. Ridership numbers for FY 2008 and FY 2009 as well as the system-wide rank for the 16 bus routes in the corridor are shown in Table 3-4.

Table 3-4
Annual Ridership for Routes Serving the Northeast Corridor

Route Number	Route Name	Type of Route	FY 08	FY 09	Percent Change	System-wide Rank FY 09
3	Plaza Road	Local	489,306	522,933	6.9%	13
4	Country Club	Local	296,778	313,819	5.7%	22
11	North Tryon	Local	1,393,864	1,431,834	2.7%	2
13	Nevin Road	Local	280,012	342,952	22.5%	20
22	Graham Street	Local	406,921	415,418	2.1%	16
23	Shamrock Drive	Local	572,559	607,503	6.1%	8
29	UNCC/SouthPark	Local	121,332	127,928	5.4%	40
39	Eastway Drive	Local	432,386	433,927	0.4%	15
47	UNCC Nugget Shuttle	Shuttle	83,808	56,401	-32.7%	73
49	UNCC Niner Shuttle	Shuttle	92,107	88,874	-3.5%	59
50	UNCC CRI Shuttle	Shuttle	38,320	52,967	38.2%	49
54x	University Research Park	Express	235,707	235,747	0.0%	27
80x	Concord Express	Express Plus	89,055	101,544	14.0%	47
81x	Wachovia CIC Shuttle	Express	34,854	45,054	29.3%	66
204	LaSalle	Neighborhood	100,415	124,649	24.1%	89
211	Hidden Valley	Neighborhood	249,626	270,556	8.4%	41
Corridor Total			4,917,050	5,172,106	5.2%	
Bus System Total			19,760,670	20,404,761	3.3%	
Light Rail			2,851,717	5,024,055	76.2%	
Total Bus & Light Rail			22,612,387	25,428,816	12.5%	

Note: Light Rail Ridership service began in the second quarter of FY 2008.

Source: *Schedule Adherence by Route FY 2009 (July 1, 2008 - June 30, 2009)*

3.1.2.6 System Performance

The existing bus routes within the Northeast Corridor currently operate in mixed-traffic on congested roadways. Therefore, the ability for CATS' bus operators to complete their routes as scheduled as well as the reliability of the service for the customer is subject to local street conditions. Presently, the most direct

service operating through the corridor is provided by Routes 11 North Tryon and 80x Concord Express. During FY2009, Route 11 ranked 64th of 79 fixed bus routes for on-time performance, with 14.7 percent late trips; performing below the system average for schedule adherence of 10.4 percent late trips.

As a result of operating in mixed traffic on congested roadways, several of the Northeast Corridor routes consistently experience delays above the system-wide average. Table 3-5 presents the Northeast Corridor routes ranked by schedule adherence as compared to the system average.

Table 3-5
Northeast Corridor Routes Ranked by Schedule Adherence as Compared to System Average

Route Number	Route Name	Type of Route	Percent Late	Rank by Schedule Adherence
Perform at or Above System Average				
4	Country Club	Local	3.8%	3
204	LaSalle	Circulator	6.0%	10
3	The Plaza	Local	6.9%	19
23	Shamrock Drive	Local	7.6%	24
13	Nevin Road	Local	8.1%	28
System Average FY 2009			10.4%	
Perform Below System average				
80x	Concord	Regional Express	11.9%	52
22	Graham Street	Local	12.2%	54
211	Hidden Valley	Circulator	12.4%	55
81x	Wachovia CIC	Express	12.7%	56
29	UNCC/SouthPark	Local	14.3%	63
11	North Tryon	Local	14.7%	64
39	Eastway	Local	19.6%	76
54x	University Research Park	Express	19.7%	77

Source: CATS Schedule Adherence by Route FY 2009 (July 1, 2008 - June 30, 2009)

3.1.2.7 Planned Transit Improvements

Over the next 25 years, numerous transit improvements have been identified and are included in the *2030 Transit Corridor System Plan*. Planned improvements range from improving the existing bus service, constructing transit corridors and facility improvements. Three other transit corridors, Southeast, West and Streetcar are in the planning process, while the North Corridor is in the design phase.

Long-term transit service improvements would require expansion of the bus fleet. The *CATS Bus Fleet Management Plan* (May 2009) recommends expanding the bus fleet by an additional 33 buses by 2025. In addition, it is estimated that approximately 372 buses would need to be replaced over the same time frame.

Specific improvements outlined in the current *CATS Bus Fleet Management Plan* and the *North Carolina Department of Transportation (NCDOT) 2009-2015 Transportation Improvement Program (TIP)* include:

- Bus Facility Improvements (TIP project TM-4701): planning, design and construction of various bus facility improvements, including shelters, signs and associated amenities.
- Transit Right-of-Way Protection – TIP project TE-4704: purchase or lease existing rail right-of-way outside of the transit corridors as funding opportunities become available through abandonment or joint use agreements.
- North Corridor Transitway (TIP project TE-4902): design, land acquisition and construction.
- Intelligent Transit Systems (TIP project TT-4906): installation of various Intelligent Transit System components such as, automated interactive voice response systems, customer information technology at transit hubs, trip planning software and other software licenses to improve the operating efficiency of the system.
- Charlotte Gateway Station (TIP project TD-4911): final design and construction of a new multi-modal transit center in Center City Charlotte near Trade Street and Graham Street.

- Park-and-Ride lots (TIP project TD-4704): planning, design and construction of park-and-ride lots throughout the transit service area.
- Replacement and expansion of Vanpool Vans, Buses and Paratransit Buses (TIP projects TA-4960, TA-4716, TA-4710 and TA-4711): replacement and expansion of these vehicles types.

3.1.3 Streets and Highways

This section describes the existing roadway network within the Northeast Corridor (including pedestrian and bicycle facilities), the planned improvements that are identified in the Mecklenburg-Union Metropolitan Planning Organization's (MUMPO) *Long Range Transportation Plan* (LRTP), major roadway traffic volumes and travel speeds, and existing parking.

3.1.3.1 Existing Roadway Network

The existing roadway network within the Northeast Corridor consists of North Tryon Street/US-29, University City Blvd./NC-49 and other interstates, arterials, collector streets and local streets. Major roadways and railroads within the corridor are shown graphically in Figure 3-2.

Major north/south and east/west roadways in the corridor include:

- Interstate 85 - an eight-lane controlled access freeway which functions as the primary commuter travel route in the Northeast Corridor. I-85 parallels North Tryon Street/US-29 for most of the corridor.
- North Tryon Street/US-29 - a major thoroughfare varying between four and six lanes with center turn lanes and median divided sections throughout.
- Old Concord Road - a two-lane thoroughfare mostly running parallel with North Tryon Street/US-29 and University City Blvd./NC-49.
- University City Blvd./NC-49 - a four-lane thoroughfare running parallel with North Tryon Street/US-29 between the I-85 Connector Road and Interstate 485 (I-485).
- Sugar Creek Road - a four-lane thoroughfare providing cross-town access and direct access to I-85 and Eastway Drive.
- Eastway Drive - a four-lane thoroughfare connecting North Tryon Street/US-29 with Sugar Creek Road and southeast Charlotte.
- I-85 Connector Road - a four-lane road providing direct access from North Tryon Street/US-29 to I-85.
- W.T. Harris Boulevard - a four and six-lane thoroughfare providing east/west access and direct access to I-85 and University City Blvd./NC-49.
- Mallard Creek Church Road - a three and four-lane thoroughfare providing access and direct access to I-85 and University City Blvd./NC-49.
- Interstate 485 - a six-lane controlled access freeway which functions as Charlotte's outer beltline.

3.1.3.2 Planned Roadway Improvements

Future roadway improvements are identified in the region's financially constrained LRTP. Projects that are listed as programmed are scheduled to be undertaken within the next five to seven years, and are included in the NCDOT's TIP or the City of Charlotte's CIP. Planned roadway improvements are those that have been identified in the *Long Range Transportation Plan*, but have not yet been programmed and funded in the current TIP or CIP. The most recent adopted transportation plans and programs at the time of this analysis were used as the basis for this Draft Environmental Impact Statement (EIS): the 2030 LRTP, the NCDOT 2009-2015 TIP, and the City of Charlotte's FY 2010 – 2014 Capital Investment Plan (CIP). On April 28, 2010, the Federal Highway Administration approved the 2035 LRTP.

Programmed projects within the Northeast Corridor are presented in Tables 3-6 and 3-7. The LRTP planned improvements within the Northeast Corridor and the horizon year for which the proposed projects are anticipated to be in place are summarized in Table 3-8. Differences in the planned roadway improvements between the 2030 LRTP and the newly adopted 2035 LRTP are also noted. Figure 3-3 displays the planned and programmed transportation projects from the 2009-2015 TIP and 2030 LRTP within the Northeast Corridor.

Table 3-6
2009-2015 NCDOT TIP Programmed Transportation Projects within the Northeast Corridor

Facility	Project Description	TIP #	Project Cost
North Tryon Street/US-29	Replace Southbound Bridge #147 over Mallard Creek	B-4779	\$3,300,000
Amtrak	Train operations between Charlotte & Rocky Mount	P-2908	\$16,619,000
Amtrak	Train operations between Charlotte & Raleigh	P-2918	\$23,928,000
Sugar Creek Road	Depress Sugar Creek Road under the existing freight tracks	U-5008	\$2,580,000 (no construction \$)
Mallard Creek Road (Sugar Creek Road to W.T. Harris Boulevard)	Widen and Relocate to four-lanes with median and bike lanes	U-2507A	\$18,300,000
I-485	New Freeway (8 lanes), from NC 115 to I-85	R-2248E	\$167,500,000
I-85 / I-485	Construct new interchange	R-2123CE	80,000,000

Source: North Carolina Department of Transportation

Table 3-7
City of Charlotte CIP Programmed Improvements within the Northeast Corridor

Facility	City of Charlotte Department	Project Status	Anticipated Construction Year	Project Cost
Davidson Street at Craighead Street	Transportation	On-Hold	n/a	\$300,000
Belmont-Gateway	Transportation	On-Hold	n/a	\$600,000
Newell-South Neighborhood Improvement Project (NIP)	Neighborhoods	Design	2012	\$3,400,000
Sugaw Creek/Ritch NIP	Neighborhoods	Real Estate	2011	\$3,000,000
John Kirk Drive/University Boulevard Intersection Improvements	Planning	Construction	2010	\$2,100,000
Countryside Sidewalk	Transportation	Construction	2010	\$350,000
Hidden Valley NIP, Phase 6	Neighborhoods	Real Estate	2010	\$950,000
Tryon Hills NIP	Neighborhoods	On-Hold	2012	\$4,000,000
Howie Acres Phase 2	Neighborhoods	Design	2011	\$1,500,000
North Tryon Street/US-29 & University City Blvd./NC-49 Interchange (the weave)	Transportation	Bid	2010	\$25,500,000
City Blvd. Extension	Transportation	Planning	2012	\$10,800,000
Craighead Road Drainage Improvements	Storm Water	Real Estate	2011	\$5,300,000
Louise Avenue CIP	Storm Water	Real Estate	2011	\$11,300,000
Shopping Center Drive Extension	Transportation	Planning	TBD	TBD
University City Blvd./NC-49 Sidewalk	Transportation	Design	2011	\$1,200,000
University City Blvd./NC-49 / WT Harris Boulevard intersection improvements	Transportation	Bid	2010	\$300,000
Atando Avenue Sidewalk	Transportation	Design	2012	\$600,000
Back Creek Church Road FTM Improvements	Transportation	Planning	n/a	n/a
Brevard-Caldwell Two-Way Conversion	Transportation	Planning	n/a	n/a
Galloway Road Sidewalk	Transportation	Construction	2010	\$250,000
Graham Street Sidewalk at I-85	Transportation	Design	2012	\$600,000
Grier Road Sidewalk	Transportation	Real Estate	2010	\$900,000
Mallard Creek Road Sidewalk	Transportation	Real Estate	2010	\$600,000
Mineral Springs Road Sidewalk	Transportation	Design	n/a	n/a
North Tryon Business Corridor	Planning	Planning	n/a	n/a
Northeast Corridor Improvements (NECI)	Multiple	Planning	n/a	n/a
Salome Church Road at Mallard Creek Road Intersection	Transportation	Design	2011	\$950,000
Sugar Creek Road / Rumble Road Left Turn Lane	Transportation	Bid	2010	\$1,000,000

Source: City of Charlotte FY 2010-2014 CIP

Table 3-8
Planned Future Roadway Improvements within the Northeast Corridor, 2030 and 2035 L RTP

Facility	Project Limits	Type	2030 L RTP Horizon Year	2035 L RTP Horizon Year
Brevard Street	11th Street to 7th Street	Widen to three lanes.	2030	Not included
36th Street	Atando Avenue to North Tryon Street/US-29	New two-lane road with median and bike lanes.	2020	Not included
North Tryon Street/US-29	Dalton Avenue to 32nd Street	Widen to five lanes.	2030	Not included
City Boulevard	Neal Road to Mallard Creek Road Extension	New four-lane road with median and bike lanes.	2020	2035
University City Blvd./NC-49	North Tryon Street/US-29 to I-485	Widen to six lanes. Includes median and bike lanes.	2030	Not included
Old Concord Road	W.T. Harris Boulevard to University City Blvd./NC-49	Widen to four lanes. Includes bike lanes.	2030	Not included
Nevin Road Extension	Black Walnut Lane to IBM Drive	New two-lane road with median and bike lanes.	2030	Not included
W.T. Harris Boulevard	North Tryon Street/US-29 to University City Blvd./NC-49	Widen to six lanes. Includes multi-use path.	2020	Not included
Mallard Creek Road	Prosperity Church Road to I-485	Widen to four lanes. Includes median and bike lanes.	2020	2015
East W.T. Harris Boulevard	University City Blvd./NC-49 to The Plaza	Widen to six lanes. Includes bike lanes.	2030	Not included
Eastern Circumferential	University City Blvd./NC-49 to Rocky River Road	New four-lane road with median and bike lanes.	2020	2035
North Tryon Street/US-29	University City Blvd./NC-49 to I-485	Widen to six lanes. Includes median, curb and gutter, and bike lanes.	2030	Not included
I-485	NC-115 to I-85 North	New eight-lane freeway.	2020	2015
I-485/I-85 North	Interchange	Revise interchange.	2020	2015
Odell School Road	I-485 to Cabarrus County Line	Widen to six lanes. Includes concrete median and bike lanes.	2030	Not included
Pavilion Boulevard Extension	Salome Church Road to N. Tryon St. (US-29)	New two-lane road	Not included	2025
Private Construction of Roadways				
10th Street Connector	North College Street to North Brevard Street	Construct a two lane road.	2010	Not included
JW Clay Boulevard Extension	Intersection of North Tryon Street/US-29 and JW Clay Boulevard	Construct fourth leg of existing intersection to the east.	2010	Not included

Source: 2030 L RTP and 2035 L RTP, MUMPO; Charlotte Department of Transportation.

3.1.3.3 Daily Traffic Volumes

Daily traffic volumes along the significant roadway segments in the Northeast Corridor were obtained from the Charlotte Department of Transportation (CDOT) and NCDOT. These volumes, presented in Table 3-9 as Annual Average Daily Traffic (AADT), represent traffic for a 24-hour period and include both directions of travel along each roadway segment.

**Table 3-9
Existing Daily Traffic Volumes, 2008**

Through Street	From	To	AADT	# of Through Lanes	Source
North Tryon Street/US-29	32nd Street	Sugar Creek Road	25,000	5 (U)	NCDOT
North Tryon Street/US-29	Sugar Creek Road	Eastway Drive	30,000	5 (U)	NCDOT
North Tryon Street/US-29	Eastway Drive	Old Concord Road	43,600	5 (D)	CDOT
North Tryon Street/US-29	Old Concord Road	Orr Road	33,000	4 (U)	NCDOT
North Tryon Street/US-29	Orr Road	Orchard Trace Lane	33,000	4 (D)	NCDOT
North Tryon Street/US-29	Orchard Trace Lane	I-85 Connector	29,000	4 (D)	NCDOT
North Tryon Street/US-29	I-85 Connector	University City Blvd./NC-49	62,000	4 (D)	NCDOT
North Tryon Street/US-29	University City Blvd./NC-49	W.T. Harris Boulevard	27,000	4 (D)	NCDOT
North Tryon Street/US-29	W.T. Harris Boulevard	Mallard Creek Church Road	32,000	4 (D)	NCDOT
North Tryon Street/US-29	Mallard Creek Church Road	I-485	25,000	4 (D)	NCDOT
12th Street	North Davidson Street	North Tryon Street/US-29	13,000	3 (O)	NCDOT
36th Street	North Davidson Street	North Tryon Street/US-29	4,900	2 (U)	CDOT
North Davidson Street	28th Street	Sugar Creek Road	9,100	2 (U)	NCDOT
Craighead Road	Philemon Avenue	North Davidson Street	6,500	2 (U)	NCDOT
Sugar Creek Road	North Davidson Street	North Tryon Street/US-29	21,000	4 (U)	NCDOT
Sugar Creek Road	North Tryon Street/US-29	I-85	29,500	4 (U)	NCDOT
Eastway Drive	Curtiswood Drive	North Tryon Street/US-29	25,000	4 (D)	NCDOT
Old Concord Road	Orr Road	North Tryon Street/US-29	14,000	2 (U)	NCDOT
Orr Road	North Tryon Street/US-29	Old Concord Road	6,600	2 (U)	NCDOT
University City Blvd./NC-49	North Tryon Street/US-29	Shopping Center Drive	36,000	4 (D)	NCDOT
W.T. Harris Boulevard	I-85	North Tryon Street/US-29	78,000	6 (D)	NCDOT
W.T. Harris Boulevard	North Tryon Street/US-29	University City Blvd./NC-49	57,000	6 (D)	NCDOT
Mallard Creek Church Road	I-85	North Tryon Street/US-29	31,000	4 (D)	NCDOT
Mallard Creek Church Road	North Tryon Street/US-29	University City Blvd./NC-49	14,600	4 (D)	CDOT

Note: (U) Undivided roadway, (D) Divided roadway, (O) One way street

3.1.3.4 Parking

Parking facilities within a ¼-mile radius of the proposed station locations were assessed along the corridor. With Center City Charlotte being the heart of the CBD, parking facilities are located throughout the area. There are over 45,000 parking spaces (public or private off-street facilities and on-street parking) available. Parking rates vary. Hourly rates range from \$2 to \$4 an hour, with a maximum daily charge of \$20, while monthly rates range from \$40 to \$160 (<http://www.aboutparking.com/charlotte-map.asp>, accessed September 2009).

Parking facilities outside of the CBD mainly consist of on-street parking or commercial shopping center parking lots. On-street parking varies depending on the surrounding land uses, traffic volumes, speeds and safety perspective. Numerous commercial shopping centers are located along the corridor providing public parking opportunities. Two other private locations contain large parking facilities, Carolinas Medical Center–University (CMC-University) and the UNC Charlotte campus.

For UNC Charlotte, the existing parking and future parking demands are near or over capacity. UNC Charlotte maintains 11,766 parking spaces on campus, divided between five parking structures and numerous surface parking lots; a sixth parking structure on the north side of campus was under construction during this report. Parking structures are located close to the academic core of the main campus and available to visitors, commuters, faculty and staff. Surface lots tend to be adjacent to university-owned residence halls, providing parking for resident students. However, there are surface parking lots for commuter students along John Kirk Drive (Lot 5, Lot 6), High-Rise Road (Lot 8), Cameron Boulevard (Lot 26,) and University Road (Lot 7). Parking fees at UNC Charlotte are \$310 for full-year students, \$190 for partial year students and \$210 for remote parking for commuters. The *2009 Draft UNC Charlotte Campus Master Plan* notes that expansion of parking facilities is essential, as well as coordination with CATS on future bus and transit service in order to assist in reducing the need for campus parking.

3.1.4 Railroads

Charlotte is served by four existing rail lines which traverse the Northeast Corridor: the North Carolina Railroad (NCR), Norfolk Southern Corporation (NS) and CSX Corporation (CSX), and one short haul line, the Aberdeen Carolina and Western Railroad (AC&W). Amtrak also operates passenger service through Charlotte.

Several improvements to both freight and passenger rail are planned for the near future. NCDOT Rail Division is working with NCR and NS to improve the Raleigh-to-Charlotte rail corridor, and assist in reducing travel times for both freight and passenger rail. According to the NCDOT Rail Division (NCDOT Rail Division website, <http://www.bytrain.org>, accessed March 2010) plans are being designed for improvements between Raleigh and Charlotte, including double tracking from North Charlotte to Concord. A separate specific project that is located within the corridor addressing the improvements to rail service is the Charlotte Rail Improvement and Safety Project (CRISP). This project is intended to improve various rail operations in Charlotte by creating and/or maintaining accommodations for the proposed Southeast High Speed Rail corridor.

3.1.4.1 Freight Railroads

Two NS freight rail lines pass through Charlotte. One line approaches from the direction of Roanoke, Virginia and the second approaches from the direction of Washington, D.C. Just northeast of Center City Charlotte, the rail lines travel parallel to the NS intermodal yard then west towards Center City Charlotte, paralleling Graham Street; the rail lines head west towards Atlanta, Georgia or south towards Columbia, South Carolina. This NS line parallels North Brevard Street within the North Charlotte Historic District and operates the NS intermodal yard just northeast of Center City Charlotte between 16th Street and 30th Street. Section 3.1.6 describes the future plans for the NS intermodal yard. There is also an existing siding located near 27th Street.

The NCR is the primary railroad leaser in the corridor, extending the full length of the corridor and forming the eastern boundary of the corridor at its northern end. The NS “O” Line and the CSX Corporation line pass through the southern end of the corridor. The AC&W diverges east from the NCR in the vicinity of 36th Street in NoDa. All four lines support freight operations. The NCR also supports the Amtrak passenger rail service.

The state-owned NCR stretches more than 300 miles from Charlotte to Morehead City, North Carolina. The section between Charlotte and Raleigh is the most active rail corridor in the state, supporting both freight and passenger services. Under a lease agreement with the state, Norfolk Southern operates main line freight service on the NCR with an average of 30 to 35 train movements per day. These train movements are expected to increase to approximately 50 to 70 trains per day by the year 2030.

NCDOT's *North Carolina Rail Plan 2000* (January 2001) reports that 47 percent of the total freight rail traffic shipped on the North Carolina rail system in 1999 originated or terminated in North Carolina and 53 percent was pass-through freight. Since 1990, freight traffic on the mainline has substantially increased. The NCRR corridor recently completed \$10 million worth of projects to improve the eastern portion of the corridor, which included curve improvements between Raleigh and Charlotte. Within Center City Charlotte, the City of Charlotte purchased the former NCRR right-of-way up to 12th Street for future transit use.

3.1.4.2 Passenger Railroads

Amtrak passenger rail operates on the NCRR through an agreement with NS. Currently, three different routes use the line: the Crescent (New York, Atlanta, and New Orleans); the Carolinian (New York, Charlotte) and the Piedmont (Charlotte, Raleigh). Each route operates to and from Charlotte daily, resulting in a combined six trains per day. The Charlotte Amtrak passenger station is currently located within the corridor along North Tryon Street/US-29, approximately two miles north of Center City Charlotte. A future separate project would relocate the passenger station to a new multi-modal transportation facility in Center City Charlotte, called the Charlotte Gateway Station, to be located along the NS main line in the vicinity of West Trade Street.

3.1.4.3 Grade Crossing Inventory

There are seven existing at-grade street crossings within the Northeast Corridor, as identified in Table 3-10. The crossings at 8th Street, 9th Street and 12th Street are along existing City of Charlotte owned right-of-way. The remaining at-grade crossings are located within the active rail corridor. All of these crossings are located on roadways that provide access to existing businesses and residential neighborhoods, and provide connectivity between neighborhoods, business parks, industrial parks and Center City Charlotte.

Table 3-10
Existing Grade Crossings within the Northeast Corridor

Grade Crossings	Number of Tracks	Number of Travel Lanes
8th Street	1	2
9th Street	1	2
12th Street	1	4
16th Street	6	2
36th Street	2	2
Craighead Road	2	2
Sugar Creek Road	2	4

3.1.5 Bikeways and Major Pedestrian Ways

3.1.5.1 Bicycle Facilities

Over the past decade, the City has improved the local environment for cyclists through a variety of measures, including:

- The construction of approximately 56 miles of bike lanes throughout the city.
- The incorporation of bicycle lanes into projects that are currently in the design phase.
- The adoption of a standard practice to provide bicycle lanes or additional space in the outside lanes, as streets are resurfaced.
- The addition of newly signed bicycle routes to the 39 mile inventory of signed bicycle routes.
- The construction of bicycle facilities in conjunction with the LYNX Blue Line, including a two-mile off-street pathway parallel to the rail line and over three miles of bicycle lanes on Old Pineville Road.
- The installation of bicycle parking facilities in Center City Charlotte and at most light rail stations.
- The construction of over 30 miles of Mecklenburg County Greenway off-street pathways, including the Mallard Creek Greenway (~6 miles), upper McAlpine Creek Greenway (~9 miles), lower McAlpine Creek/McMullen Creek Greenway (~5 miles), Torrence Creek Greenway (~1 mile), Irwin Creek

Greenway (~2 miles) and Little Sugar Creek Greenway (~3 miles). As well as the construction of the Toby Creek Greenway on the campus of the UNC Charlotte (within the northeast corridor), which is currently underway.

- The development of the *Charlotte Cycling Guide*, which includes a map of existing bikeways, recommended routes and information related to bicycle safety and awareness. The adoption of bicycle parking requirements, requiring new and to construct bicycle parking for new and significantly modified land developments.
- The adoption of the *Urban Street Design Guidelines*. This policy document defines the street design for the various classifications of roadways within Charlotte. Bicycle accommodations are included for street classifications considered suitable for bicycling, including bicycle lanes, shared lanes and adjacent pathways.
- The adoption of the *2008 City of Charlotte Bicycle Plan*, a citywide bicycle planning document that identifies policies and strategies to expand the City's bicycle network and make cycling a safer and more efficient means of transportation. Most notable is Policy Strategy 3.1, which recommends that "the City will consider bicycle accommodations in the planning, design and development of all rapid transit corridors, station areas and transit hubs. On-going rapid transit planning should take bicycle accommodations into account in the station areas, along roadways leading to the stations, along the transit corridors and on the vehicles."

Table 3-11 lists key bicycle facilities planned in the Northeast Corridor. Additionally, Figure 3-4 depicts the planned bicycle facility improvements.

Table 3-11
Proposed Projects with Bikeways within the Northeast Corridor

Location	Type of Facility
North Tryon Street/US-29	Bicycle lanes
Matheson Avenue	Bicycle lanes
Old Concord Road	Bicycle lanes
West Rocky River Road	Bicycle lanes
Mallard Creek Church Road	Bicycle lanes
West Mallard Creek Church Road	Bicycle lanes
Salome Church Road	Bicycle lanes
Pavilion Boulevard	Bicycle lanes
Mallard Creek Greenway	Off-road trail
Toby Creek Greenway	Off-road trail

Source: *City of Charlotte Bicycle Plan, 2008*

3.1.5.2 Pedestrian Ways

According to the 2030 LRTP, the total existing length of sidewalks in the City is 1,450 miles. Currently, in the Northeast Corridor, sidewalks are not consistently provided along the roadways. The continuity of the sidewalk network is minimal or non-existent in many areas; and gaps primarily exist along North Tryon Street/US-29 within the "weave" area and north of W.T. Harris Boulevard. However, the network is more prevalent within Center City and in the NoDa area.

MUMPO works with NCDOT to incorporate sidewalk construction as a matter of standard practice on state roadway projects within the urban area. MUMPO takes a strong stance to ensure that new roadway construction projects provide room for future sidewalk improvements and do not create pedestrian barriers to the provision of pedestrian ways.

Additionally, the City establishes initiatives to provide multi-use paths through the CIP. The City funds both thoroughfare and non-thoroughfare multi-use path construction. It is the current policy to construct multi-use paths on both sides of all thoroughfares; on one side of all collectors; and, after assessing requests, on local streets. As such, CDOT identified the following needs:

- 685 miles of new multi-use path needs on both sides of Charlotte's thoroughfares; and,
- 1,400 miles of new multi-use path needs on one side of Charlotte's local and collector streets.

The current funding level allows for the construction of approximately ten miles of new sidewalks each year. In order to target the funds where they are most needed, CDOT utilizes a ranking system to evaluate each section of potential sidewalk and to prioritize the segment based upon traffic counts, connectivity to a variety of land uses, roadway safety, network completion and transit access.

3.1.6 Trucks and Intermodal

According to the 2030 LRTP, Charlotte's second largest economic activity is warehousing and freight distribution, for which Charlotte ranks sixth in the United States. One of the region's major intermodal sites is currently located within the Northeast Corridor, the Norfolk Southern Intermodal Freight Terminal paralleling North Brevard Street. Norfolk Southern, however, is planning to construct a new intermodal terminal near the Charlotte-Douglas International Airport and relocate operations there.

3.2 Environmental Consequences

The following sections describe the potential impacts to the transportation system (transit, streets and highways, rail and non-motorized forms) of the No-Build, the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option. The impacts are a comparison amongst the alternatives under study.

3.2.1 Transit

Impacts to the public transportation service under the No-Build, the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option are measured in terms of their effectiveness in providing improved transit service to potential users in the corridor. Measures of transit service levels include the geographic coverage, operating characteristics, transfers, travel time, service reliability and safety of the transit system, as well as passenger comfort. The improved service levels should result in higher transit ridership. Therefore, the effectiveness of the alternatives are measured by ridership and system performance measures.

Since the proposed Light Rail Alternative station locations are in proximity to the stations for the Light Rail Alternative – Sugar Creek Design Option; and since the operating characteristics, transfer opportunities, transit travel times, reliability safety, comfort and ridership for the would be the same as the proposed Light Rail Alternative, the impacts to public transportation service for the Light Rail Alternative – Sugar Creek Design Option would be the same as the proposed Light Rail Alternative.

3.2.1.1 Geographic Coverage within Service Area

All alternatives would improve service frequencies and facilities in the Northeast corridor. Under the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option, the type and quality of service would be improved. Fixed guideway transit service with a dedicated right-of-way would provide faster and more reliable service than bus service. The proposed Light Rail Alternative would provide park-and-ride facilities and feeder bus service that would expand the area that would have access to rail transit service.

3.2.1.2 Operating Characteristics

Operating plans for the proposed Light Rail Alternative are described in further detail in the *2009 Draft Rail Operations and Maintenance Plan* (ROMP). The ROMP describes the operations strategies, maintenance requirements, LRT operations and system elements. In general, the hours of operation would be the same for all alternatives. The differences would be in the transit route coverage and headways.

Light Rail Service Headways and Fleet Requirements

Under the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option, the light rail service for the opening year and the 2030 horizon year would operate at the frequencies shown in Table 3-12. The operating analysis indicated that two different operating scenarios would provide sufficient capacity and meet the proposed projected peak period demand for the 2030 forecast year. The

first operating scenario would be two-car trains with six-minute headways. The second operating scenario would be three-car trains with 10-minute headways. Six-minute headways are analyzed and presented in the Draft EIS to represent a worst case traffic and noise scenario. As ridership projections are refined, a final operating plan will be determined and presented in the Final EIS.

The Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option would require 26 vehicles to be added to the existing fleet of 20. This would bring the total light rail vehicle fleet for CATS to 46 vehicles.

Table 3-12
Proposed Light Rail Headways by Service Period

	Existing 2009	Opening Year	Forecast Year 2030
Peak Periods	10 minute	7.5 minute	6 minute
Base Periods	15 minute	15 minute	15 minute
Early/Late Periods	30 minute	20 minute	20 minute
Weekend Base	20 minute	15 minute	15 minute
Weekend Early/Late	30 minute	30 minute	30 minute

Source: *Draft Rail Operations and Maintenance Plan*, 2009

Bus Routes and Service Headways

As described in Chapter 2.0: Alternatives Considered, the No-Build Alternative would include improvements to service frequencies for routes operating within the Northeast Corridor. Under the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option, bus route alignments would be modified to feed into the light rail stations. Route headways would be adjusted to provide more frequent service and minimize transfer waiting time. Route 11 would be the only bus route that would operate with less frequent service under the proposed Light Rail Alternative; since Route 11 operates along the same alignment as the rail line, the reduced service on this line is justified. Table 3-13 compares the future headways by alternative.

Table 3-13
Comparison of Headways for Bus Routes by Alternative, 2030

Route Number	Peak Headway (minutes)		Mid-Day Headway (minutes)		Night Headway (minutes)	
	No-Build	Light Rail Alternative ¹	No-Build	Light Rail Alternative ¹	No-Build	Light Rail Alternative ¹
3	30	15	30	30	45	45
4	20	15	30	30	45	45
11	10	15	20	30	30	30
22	35	30	35	35	45	40
23	20	15	35	30	40	40
29	60	15	60	30	60	60
39	35	30	45	30	45	30
54x	15	15	0	0	0	0
80x	30	30	0	0	0	0
81	60	15	60	30	0	0
110	n/a	30	n/a	30	n/a	60
211	20	15	20	20	30	30
360	30	30	40	40	60	60
807	n/a	30	n/a	30	n/a	30

n/a – Not Applicable

¹Represents both the Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option.

Source: AECOM and the Metrolina Regional Travel Demand Model, 2009

3.2.1.3 Transfers

Under the No-Build Alternative, transit riders would continue to transfer to/from other bus routes at transit centers. With the proposed Light Rail Alternative and Light Rail Alternative - Sugar Creek Design Option bus service would be modified to service the light rail stations along the Northeast Corridor. Route schedules would be timed to minimize waiting time in transferring to and from light rail. In addition, the

proposed Light Rail Alternative would provide a continuous light rail line from the South Corridor to the Northeast Corridor, without requiring a transfer.

3.2.1.4 Transit Travel Times

Under the No-Build Alternative, transit services would continue to travel with general traffic along congested roadways in the Northeast Corridor and would be subject to traffic conditions. Compared to the No-Build Alternative, the proposed Light Rail Alternative would demonstrate an advantage in travel time, providing faster service because light rail would operate within a dedicated transit corridor. Table 3-14 provides a comparison of existing (2009) and future (2030) transit travel times.

Table 3-14
Transit Travel Times (minutes) for Selected Trips, AM Peak

Travel Market	2009	2030	
	Existing Condition	No-Build Alternative	Light Rail Alternative
Inbound	In-Vehicle Time (Weighted Time¹)		
NoDa to Center City Charlotte	15.7 (41.8)	18.7 (40.3)	9.0 (22.9)
University City to Center City Charlotte	34.1 (60.6)	38.4 (64.9)	18.6 (33.5)
UNC Charlotte to Center City Charlotte	51.8 (84.2)	57.9 (90.2)	25.2 (46.3)
University Research Park to Center City Charlotte	47.9 (102.6)	52.2 (106.9)	32.8 (81.9)
Cabarrus County to Center City Charlotte	90.4 (123.2)	101.9 (134.8)	76.1 (120.7)
UNC Charlotte to NoDa	35.0 (76.7)	39.5 (78.2)	16.3 (41.0)
Outbound	In-Vehicle Time (Weighted Time¹)		
Center City Charlotte to NoDa	13.0 (45.2)	14.4 (33.3)	9.0 (22.9)
Center City Charlotte to University City	29.9 (54.1)	32.2 (56.4)	18.6 (33.5)
Center City Charlotte to UNC Charlotte	49.1 (79.1)	54.9 (84.9)	25.3 (46.4)
Center City Charlotte to University Research Park	23.1 (97.2)	28.0 (102.0)	31.7 (85.6)
Center City Charlotte to Cabarrus County	76.7 (135.8)	84.6 (143.7)	73.0 (173.0)
NoDa to UNC Charlotte	35.5 (74.1)	40.6 (79.2)	16.3 (41.1)

Note: ¹Weighted Time = In-Vehicle Time + 1.50*Initial Wait Time + 2.58*Transfer Wait Time + Transfer Penalty + Wtd (Access + Egress + Transfer) Walk

Source: AECOM and Metrolina Regional Travel Demand Model, 2009

Table 3-15 shows the comparative auto travel times for selected trips. In 2030, an automobile would take over 28 minutes from Center City Charlotte to UNC Charlotte and over 35 minutes in the reverse direction. Compared to automobile travel times, the proposed Light Rail Alternative would result in approximately seven minutes of travel time savings from Center City Charlotte to UNC Charlotte.

Table 3-15
Auto Travel Times (minutes) for Selected Trips, AM Peak

Selected Trip	2009	2009	2030	2030
	Outbound	Inbound	Outbound	Inbound
Center City Charlotte to/from University Research Park	17.9	27.1	21.1	30.4
Center City Charlotte to/from UNC Charlotte	22.1	32.3	28.8	35.8
Center City Charlotte to/from I-485	18.6	32.8	23.1	37.3

Source: AECOM and Metrolina Regional Travel Demand Model, 2009

3.2.1.5 Reliability and Safety

Reliability and safety are related to the extent to which transit vehicles operate on an exclusive alignment. The No-Build Alternative would continue to operate in general traffic along existing roadways, subject to congestion and delays associated with traffic conditions, traffic signal delay, accidents and pedestrian crossings. Since the No-Build Alternative would limit transit service to existing roadways, transit service would be less reliable, as service would continue to be interrupted or delayed due to traffic congestion.

The proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option would operate on exclusive right-of-way within an existing railroad corridor, within the NCDOT right-of-way along North Tryon Street/US-29, and in a new dedicated right-of-way within the UNC Charlotte campus area. Along the proposed alignment in North Tryon Street/US-29, existing roadway left turn median openings would be eliminated or signalized. A number of grade separations would be constructed to eliminate at-grade conflicts with vehicular traffic. In addition, vehicular traffic crossing the alignment would utilize signalized intersections, with signal pre-emption for light rail movements. Since the proposed Light Rail Alternative would operate in a dedicated corridor, transit service would increase in respect to both reliability and safety.

3.2.1.6 Comfort

Industry guidelines for evaluating passenger comfort are documented in the *Transit Capacity and Quality of Service Manual* (TCQSM, 2nd Edition, 2003). The manual recommends using a level of service (LOS) to evaluate passenger comfort using the predicted transit vehicle passenger loads. For this purpose, a LOS is defined based on the area available to each standing passenger in the maximum load section; the location on the line where the most passengers will be on-board the train. The manual recommends a LOS of “D” or better is recommended for achieving a comfortable passenger loading level.

For the No-Build Alternative, projected peak loads in the forecast year 2030 were identified for the existing portion of the LYNX Blue Line. For the existing LYNX Blue Line, the highest projected hourly passenger volume during the peak period in 2030 would occur northbound between Bland and Carson Stations, with approximately 2,020 passengers traveling on that segment during the peak hour. As described previously in Section 3.2.1.2, peak service on the existing line in 2030 would consist of 2-car trains operating at six-minute headways. Based on this service level and projected demand, the typical standee space over the peak hour will be 0.75 meters squared (m^2) per passenger, which is equivalent to a LOS of “C”.

For the proposed Light Rail Alternative, peak loads were identified in both directions of the LYNX Blue Line during the peak hour. The highest hourly passenger volume northbound during the peak period in 2030 would occur between Carson and Stonewall Stations, with 2,060 passengers traveling on that segment. The highest hourly volume southbound during that same period would occur between Parkwood and 9th Street Stations, with 2,422 passengers traveling on that segment. As described in Section 3.2.1.2, the proposed Light Rail Alternative would operate every six-minutes during the peak period with 2-car trains. Based on this service level and projected demand, the typical standee space over the peak hour will be 0.47 m^2 per passenger, which is equivalent to a LOS of “D”.

3.2.1.7 Transit Ridership

The measures used to indicate the impact of the alternatives on transit ridership include:

- Total number transit trips by trip purpose;
- Change in transit trips;
- Peak hour riders on light rail;
- Daily number of boardings by station; and,
- Special event ridership.

As noted previously, the two station locations that vary between the Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option are not significantly different; and the operating characteristics, transfers, transit travel times, would be the same. Therefore, travel forecast model runs were not performed separately for the Light Rail Alternative – Sugar Creek Design Option, and the results presented below for the Light Rail Alternative represent both the Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option.

Total and New Transit Trips

The proposed Light Rail Alternative is intended to provide additional transit opportunities to the residents of Charlotte and the surrounding area. The trips shown in Table 3-16 represent the number of linked trips in the region. A linked trip is a trip from an origin to a destination, regardless of the number of transfers.

The No-Build Alternative is projected to attract 83,041 transit linked trips in 2030. The proposed Light Rail Alternative would increase transit ridership substantially attracting 101,302 transit linked trips. As compared to the No-Build Alternative, 18,261 additional riders would utilize transit under the proposed Light Rail Alternative. Approximately 49 percent of the projected transit trips for the proposed Light Rail Alternative would be home-based work trips and 57 percent of all transit trips would occur during the peak time period.

Table 3-16
Daily Transit Trips by Purpose, 2030

Trip Purpose	No-Build Alternative	Light Rail Alternative¹
HBW Peak	28,787	35,169
HBW Off-Peak	12,361	14,748
HBO Peak	11,411	13,484
HBO Off-Peak	15,514	18,239
NHB Peak	4,697	5,728
NHB Off-Peak	6,241	8,011
HBU Peak	2,069	3,001
HBU Off-Peak	1,962	2,922
Total Transit Linked Trips	83,041	101,302

¹Represents both the Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option.
Source: AECOM and the Metrolina Regional Travel Demand Model, 2009

Transit Mode Share

Determining the share of transit trips provides insight on the shift from automobiles to transit. Compared to the No-Build Alternative, the proposed Light Rail Alternative results in an increase in transit person-trips and a decrease in overall highway persons-trips for the region as shown in Table 3-17.

Table 3-17
Comparison of Total Trips by Mode, 2030

	Daily Person-Trips	
	No-Build Alternative	Light Rail Alternative
Total Transit Person-Trips	83,041	101,302
Total Highway Person-Trips	12,277,696	12,259,688
Total Non-Motorized Person Trips (Walk/Bike)	210,826	210,573
Total Person-Trips	12,571,563	12,571,563

Source: AECOM and the Metrolina Regional Travel Demand Model

Bus Ridership

Under the No-Build Alternative, bus routes in the Northeast Corridor are projected to carry 14,623 weekday riders. The proposed Light Rail Alternative would result in an increase of 3,954 additional weekday riders over the No-Build Alternative. This increase is a result of riders using buses to access the light rail stations. Table 3-18 shows the 2030 projected bus riders (unlinked trips) for each alternative. Unlinked passenger trips count each boarding as a separate trip regardless of transfers.

Table 3-18
Northeast Corridor Bus Ridership Summary by Alternative, 2030

Route Name	2030 Average Weekday Ridership	
	No-Build	Light Rail Alternative ¹
Route 3 - Plaza Road	2,207	2,014
Route 4 - Country Club	678	896
Route 11 - North Tryon/Sugar Creek	4,064	1,446
Route 22 - Graham Street	1,309	1,163
Route 23 - Shamrock Drive	2,294	2,134
Route 29 - UNC Charlotte/South Park	1,281	4,462
Route 39 - Eastway Drive	805	939
Route 54x - University Research Park	647	585
Route 80x - Concord Express	221	261
Route 81 - Wachovia CIC Shuttle	94	961
Route 110 - Concord Mills Mall	n/a	1,201
Route 211 - Hidden Valley	751	1,632
Route 360 - City Boulevard/NC-49	272	495
Route 807 - Old Concord Road	n/a	368
Total Average Weekday Bus Ridership	14,623	18,577

¹Represents both the Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option.
Source: AECOM and the Metrolina Regional Travel Demand Model, 2009

Fixed Guideway Ridership

Fixed guideway ridership refers to boardings specifically on the light rail system. The passengers boarding the trains would arrive at stations either by walking, driving or by taking a bus. For the No-Build Alternative, approximately 23,700 riders would use the existing LYNX Blue Line light rail service in 2030. Under the proposed Light Rail Alternative, approximately 23,800 additional riders would use light rail, resulting in a total of 47,500 daily light rail boardings for the entire alignment (South to Northeast).

Daily Station Boardings

Light rail ridership was analyzed for each station's peak and off-peak ridership (six-minute headways), as shown in Table 3-19. Under the proposed Light Rail Alternative, five stations in the Northeast Corridor would have daily boardings well over 1,500. Two of those five stations would be major trip destinations: Center City Charlotte and the UNC Charlotte campus. The other three stations would be major park-and-ride locations, with the highest projected boardings at the I-485/N. Tryon Station with just under 2,000 daily boardings.

Table 3-19
Light Rail Boarding Projections, 2030

Station	No-Build Alternative			Light Rail Alternative		
	Peak	Off-Peak	Daily	Peak	Off-Peak	Daily
I-485/South Blvd	1,771	664	2,435	1,783	671	2,455
Sharon Rd West	934	470	1,405	944	477	1,422
Arrowood	799	643	1,442	808	654	1,462
Archdale	622	459	1,080	620	464	1,084
Tyvola	1,001	929	1,930	1,028	957	1,985
Woodlawn	839	845	1,684	861	866	1,727
Scaleybark	802	700	1,502	817	716	1,533
New Bern	450	438	888	471	461	932
East-West Blvd.	791	672	1,463	863	742	1,605
Bland	383	370	753	431	422	852
Carson	309	252	560	414	331	745
Stonewall	975	404	1,379	1,555	598	2,153
CTC/Arena	1,102	585	1,687	1,502	712	2,214
3rd St. / Convention Center	2,053	1,187	3,240	4,147	2,268	6,416
7th Street	1,485	748	2,233	2,460	1,369	3,829
9th Street	n/a	n/a	n/a	1,051	550	1,600
Parkwood	n/a	n/a	n/a	271	371	642
25th Street	n/a	n/a	n/a	183	174	357
36th Street	n/a	n/a	n/a	896	604	1,499
Sugar Creek	n/a	n/a	n/a	1,291	1,013	2,304
Old Concord Road	n/a	n/a	n/a	564	455	1,019
Tom Hunter	n/a	n/a	n/a	491	418	909
University City Blvd.	n/a	n/a	n/a	1,021	561	1,582
McCullough	n/a	n/a	n/a	526	497	1,024
JW Clay Blvd.	n/a	n/a	n/a	424	461	884
UNC Charlotte	n/a	n/a	n/a	995	1,124	2,119
Mallard Creek Church	n/a	n/a	n/a	695	477	1,172
I-485/North Tryon	n/a	n/a	n/a	1,449	497	1,946
Total	14,317	9,365	23,682	28,562	18,908	47,470

Source: AECOM and the Metrolina Regional Travel Demand Model, 2009

Peak Hour Line Volumes

Table 3-20 shows the projected peak hourly passenger loads for light rail. The peak hourly passenger load is the maximum number of passengers that travel past a single point on a route during the peak hour. As shown in Table 3-21, the highest line volume in the southbound direction would occur between Parkwood and 9th Street Stations, where trains would carry 2,422 annual passengers during the a.m. peak hour. During the same time in the northbound direction, the maximum loading would occur between Carson and Stonewall Stations. A total of 2,060 riders would ride the northbound trains on this section of the line. As noted earlier, the light rail operating plan calls for running two-car trains on six-minute headways during the peak hours. This would provide one-way hourly carrying capacity of 2,520 passengers per hour per direction, which should provide adequate capacity to handle the projected peak hourly demand.

Table 3-20
Light Rail AM Peak Hour Directional Loads, 2030

Station	No-Build Alternative		Light Rail Alternative	
	Northbound	Southbound	Northbound	Southbound
I-485/South Blvd	753	0	758	0
Sharon Rd West	1,028	97	1,035	98
Arrowood	1,172	195	1,178	199
Archdale	1,311	257	1,317	266
Tyvola	1,476	295	1,485	303
Woodlawn	1,656	388	1,668	407
Scaleybark	1,920	451	1,935	476
New Bern	1,976	457	1,994	487
East-West Blvd.	1,982	465	2,012	501
Bland	2,023	481	2,056	542
Carson	2,020	520	2,060	600
Stonewall	1,648	546	1,700	669
CTC/Arena	1,143	532	1,233	928
3rd Street / Convention Center	627	514	943	1,070
7th Street	0	86	466	1,718
9th Street	n/a	n/a	298	2,301
Parkwood	n/a	n/a	284	2,422
25th Street	n/a	n/a	284	2,346
36th Street	n/a	n/a	316	2,293
Sugar Creek	n/a	n/a	339	2,064
Old Concord Road	n/a	n/a	339	1,590
Tom Hunter	n/a	n/a	367	1,397
University City Blvd.	n/a	n/a	339	1,278
McCullough	n/a	n/a	299	993
JW Clay Blvd.	n/a	n/a	273	922
UNC Charlotte	n/a	n/a	94	926
Mallard Creek Church	n/a	n/a	23	901
I-485/North Tryon	n/a	n/a	0	673

Source: AECOM and the Metrolina Regional Travel Demand Model, 2009

Light Rail Passenger Mode of Access

For the proposed Light Rail Alternative, approximately 20 percent would drive to a park-and-ride, 22 percent of riders would take a bus to a station, 54 percent would walk to a station and four percent would be dropped off (kiss-and-ride). The high percentages of riders who would walk to a station reflect destination stations, such as Center City Charlotte and UNC Charlotte, as well as stations where park-and-ride facilities are not available.

In the Northeast Corridor, the I-485/N. Tryon Station would serve the largest number of patrons driving to a station due to the proximity of I-485, with just over 1,600 drive access riders. The Sugar Creek Station would have the second highest demand for park-and-ride access with a projected drive access demand of 1,400 riders.

Special Event Ridership

In addition to the trip purposes discussed above, the light rail service is expected to serve a number of special events in the Center City Charlotte and at UNC Charlotte, which are not captured in the ridership projections presented above. The proposed Light Rail Alternative is expected to carry an additional 855,237 riders for special events by 2030, including events at the Bank of America stadium (NFL Carolina Panthers), Time Warner Cable Area (NBA Charlotte Bobcats and AHL Charlotte Checkers hockey), the future baseball stadium in Center City Charlotte, Charlotte Convention Center events and UNC Charlotte football. This projected ridership also includes students traveling between the UNC Charlotte Center City campus and its main campus.

3.2.2 Impacts to Streets and Highways

All three alternatives considered would have some level of impact to the local and regional roadway network within the Northeast Corridor. The No-Build Alternative relies primarily on street improvements to address projected travel demand, while the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option encourage shifts from automobile to transit. This modal shift may be effective at reducing the growth of congestion on a regional scale. However, because light rail encourages concentrations of higher density development near its stations, local traffic impacts adjacent to stations may result. This section details the regional and local impacts of these alternatives on the transportation system.

3.2.2.1 Systems Performance

Table 3-21 provides a comparison of 2030 projected regional automobile travel, summarized by Vehicles Miles Traveled (VMT) and Vehicles Hour Traveled (VHT), for each alternative. The proposed Light Rail Alternative would result in 141,259 fewer daily miles traveled and 5,490 fewer vehicle hours on the region's roadways than the No-Build Alternative. On a regional basis this represents a reduction of approximately 0.1 percent.

Table 3-21
Comparison of VMT and VHT, 2030

	2030	
	No-Build Alternative	Light Rail Alternative ¹
Vehicles Miles Traveled		
VMT Peak	30,964,446	30,870,685
VMT Off-Peak	32,511,031	32,463,532
VMT Daily	63,475,476	63,334,217
Vehicles Hour Traveled		
VHT Peak	1,288,456	1,284,107
VHT Off-Peak	778,818	777,676
VHT Daily	2,067,274	2,061,784
Change from No-Build		
VMT Daily	n/a	(141,259)
VHT Daily	n/a	(5,490)

Source: AECOM and Metrolina Regional Travel Demand Model, 2009

3.2.2.2 Local Traffic Operations

This section describes existing and projected traffic conditions for local roadways and intersections, and identifies potential traffic impacts resulting from the proposed Light Rail Alternative. These impacts include changes in traffic operations, such as delay, travel time and speed and are based on analysis of the morning and afternoon peak hours. The analysis focused on road/rail crossings and intersections in proximity to the light rail alignment and transit stations. Detailed information, beyond that provided in this chapter, can be found in the *Traffic Analysis Report, November 2009*.

Traffic Forecasting Methodology

The analysis of future roadway and intersection traffic conditions was based on growth factors derived from the Metrolina 2030 Regional Travel Demand model. These growth factors are the result of comparing future 2030 model traffic volumes to the base year model traffic volumes and were developed by dividing the future year volumes by the base year volumes. Because growth factors and land uses vary significantly over the length of the corridor, the corridor was divided into three distinct segments. A map illustrating the location of each segment can be found in Figure 3-5. Segment 1 includes rail crossings and intersections from Center City Charlotte north to Owen Boulevard along North Tryon Street/US-29. This segment also includes all intersections analyzed on Sugar Creek Road and Eastway Drive. Segment 2 begins with Tom Hunter Road and runs along North Tryon Street/US-29 through Barton Creek Drive. Segment 3 includes Mallard Creek Church Road up to the I-485 Ramps along North Tryon Street/US-29.

Table 3-22
Growth Factors

Corridor Segment	Growth Factor
Segment 1 (Center City Charlotte to Owen Boulevard)	1.30
Segment 2 (Tom Hunter Road to Barton Creek Drive)	1.25
Segment 3 (Mallard Creek Church Road to I-485 Outer Ramp)	1.55

Source: Charlotte Department of Transportation and Metrolina Regional Travel Demand Model, 2009

Traffic volumes used in the analysis of 2030 conditions resulted from taking 2008 base year counted traffic and multiplying that by the growth factors shown in Table 3-22. The base year volumes were obtained from routine counts made by CDOT and by counts made specifically for this project in 2008 and 2009. The 2030 No-Build volumes simply reflect the application of these growth factors to 2008 base year traffic counts. The 2030 Light Rail Alternative volumes reflect a similar application of growth factors, but also include the addition of traffic generated by park-and-ride stations. Build year volumes were also adjusted to account for the redistribution of traffic expected as a result of project-related roadway and access changes.

Roadway Modifications

The proposed Light Rail Alternative would include the roadway modifications as described in Section 2.2.3.4 in Chapter 2.0: Alternatives Considered. For the Light Rail Alternative, the proposed light rail alignment travels within an existing railroad right-of-way and the median of North Tryon Street/US-29. Roadway modifications inside the railroad right-of-way as a result of the proposed project include a bridge extension of the Eastway Drive overpass, the depression of 36th Street under the existing and future railroad tracks and the proposed light rail tracks and crossing improvements at street/rail crossings. The Sugar Creek Road grade separation project is a separate future project, which will depress Sugar Creek Road under the existing freight tracks and the proposed light rail tracks.

The majority of the roadway modifications would occur where the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option are situated in the median of North Tryon Street/US-29. North Tryon Street/US-29 would be rebuilt to a complete urban street that accommodates light rail, buses, automobiles, pedestrians and bicyclists. The number of through lanes available to traffic would remain unchanged for the length of North Tryon Street/US-29 (four through lanes), turn lanes would vary. Street features would include median refuge areas, pedestrian crossing signals, multi-use paths, planting strips and bicycle lanes in station areas.

In addition to upgrading the street features of North Tryon Street/US-29, there would also be several changes to roadway access and traffic control. For safety reasons, traffic and pedestrian movements across the light rail tracks must be controlled by traffic signals and railroad crossing signals/gates. This necessitates closing median openings at midblock locations and at some local side-streets. Where medians are closed, access would be limited to right-in/right-out traffic movements and pedestrian crossings of North Tryon Street/US-29 would be restricted. Median openings would remain at all existing signalized intersections. Since cross-access and street connectivity are vital transportation components to sustaining neighborhoods and businesses adjacent to North Tryon Street/US-29, the proposed Light Rail Alternative would include five new signalized intersections. Four median openings would be closed along North Tryon Street/US-29. Where the Light Rail Alternative – Sugar Creek Design Option enters and leaves North Tryon Street/US-29, two intersections would be signalized as well. Design and construction of the proposed Light Rail Alternative and its design option and their physical components would not preclude the subsequent opening of a median at Hampton Church Road and a median at a future street located in the vicinity of Stetson Drive. Tables 3-23 and 3-24 summarize existing and proposed median openings along North Tryon Street/US-29.

Table 3-23
North Tryon Street/US-29 Summary of Median Openings

	Old Concord Road to UNC Charlotte Research Drive	
	Existing	Light Rail Alternative
Signalized	11	16
Unsignalized	9	0

Table 3-24
North Tryon Street/US-29 Median Opening Locations

Intersection	Existing	No-Build	Light Rail Alternative
Old Concord Road	Signalized	Signalized	Signalized
Orr Road	Unsignalized	Signalized	Signalized
Austin Drive	Unsignalized	Unsignalized	Closed
Arrowhead Road	Unsignalized	Signalized	Signalized
Heathway Drive	Unsignalized	Unsignalized	Closed
Owen Boulevard	Unsignalized	Unsignalized	Signalized
Tom Hunter Road	Signalized	Signalized	Signalized
Midblock (Post Office Driveway)	Unsignalized	Unsignalized	Closed
Orchard Trace Lane	Unsignalized	Unsignalized	Signalized
Reagan Drive/Kemp Street*	Unsignalized	Closed	Closed
I-85 Connector	Signalized	Signalized	Signalized
University City Blvd. Station Access	n/a	n/a	Signalized
Stetson Drive*	Unsignalized	Closed	Closed
University City Blvd.	Signalized	Signalized	Signalized
Shopping Center Drive	Signalized	Signalized	Signalized
Clark Boulevard	Unsignalized	Unsignalized	Closed
McCullough Drive	Signalized	Signalized	Signalized
Midblock (NC Highway Patrol Driveway)	Unsignalized	Unsignalized	Closed
Ken Hoffman Drive	Signalized	Signalized	Signalized
WT Harris Boulevard	Signalized	Signalized	Signalized
JM Keynes Drive	Signalized	Signalized	Signalized
JW Clay Boulevard	Signalized	Signalized	Signalized
UNC Charlotte Research Drive	Signalized	Signalized	Signalized

* Median opening is eliminated with Weave reconstruction project

n/a – Not Applicable; Intersection does not exist under Existing Conditions or No Build Alternative.

Roadway and traffic control changes would also be proposed in areas where light rail would not operate within North Tryon Street/US-29. These changes include a new traffic signal at the primary entrance to the I-485/N. Tryon Station (North Tryon Street/US-29 and Morningstar Place Drive) and a limited access median opening to a proposed new street just north of the I-485/N. Tryon Station.

Other roadway and rail improvements that would change traffic patterns in the corridor include:

- For Sugar Creek Station Park-and-Ride Option 1, Raleigh Street would be realigned to eliminate the offset intersection at Sugar Creek Road. Raleigh Street would serve as an access point to the Sugar Creek Station Park-and-Ride facility. In addition, a new traffic signal would be added to the North Davidson Street and Sugar Creek Road intersection. Analysis results for Option 1 are presented in Table 3-26.
- For Sugar Creek Park-and-Ride Option 2, the Sugar Creek Road & North Davidson Street intersection would be signalized and two lanes (one in each direction) would be added to North Davidson Street. The additional southbound lane would become a drop right turn lane into the proposed parking garage entrance. The additional northbound lane would accommodate a left and right turn lane onto Sugar Creek Road. An eastbound right turn lane and a westbound left turn lane would also be added to Sugar Creek Road at the intersection with North Davidson Street. Analysis results for Option 2 are presented in Table 3-27.
- The Old Concord Road and North Tryon Street/US-29 intersection would be re-configured from a high speed design to a more urban intersection design, and would include a grade separated bridge for the light rail alignment to access the median of North Tryon Street/US-29.
- North Tryon Street/US-29 & Orr Road – A fourth leg would be added to the intersection under the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option. The additional eastbound Orr Road approach intends to restore connectivity for residents on the west side of North Tryon Street/US-29 that will be lost due to the proposed turning restrictions at Austin Drive.

- Entrances to station park-and-ride facilities would be constructed along Sugar Creek Road, North Tryon Street/US-29 and Old Concord Road.
- The light rail alignment would be constructed to cross under the northbound travel lanes of North Tryon Street/US-29 just north of the UNC Charlotte Research Drive intersection in order to access the campus and the UNC Charlotte station.

Intersection Level of Service

An analysis of over 55 intersections was conducted to determine the effects that the proposed Light Rail Alternative and the design option would have on traffic operations within the corridor. This analysis consisted of estimating intersection capacity usage for all intersections and alternatives under study, as well as determining vehicular level of service (LOS) at those intersections. Capacity usage is reported in terms of a volume to capacity ratio (V/C), and level of service is reported based on the average vehicle delay experienced at an intersection. Volume to capacity ratios that are close to or that exceed 1.0 are indicative of congested traffic conditions. Level of service is a qualitative measure of traffic flow intended to reflect driver discomfort and frustration, with a criteria range of A to F. LOS A through D represent what is generally considered to be acceptable motorist delays, with LOS D approaching unstable traffic flows that might result in motorists waiting through more than one signal cycle. LOS E and F reflect congested to extremely congested traffic conditions.

Synchro 7.0 was used to estimate capacity conditions at all intersections within the study area and was also used to determine LOS for locations where light rail operations would not directly affect traffic flow. Where light rail and vehicular traffic would interact, VISSIM 5.10 (a traffic simulation program capable of modeling light rail and vehicular traffic) was used instead. VISSIM provided estimates of vehicle delay, vehicle queuing and spillback, as well as travel times and speeds; and was used to quantify the benefits and impacts to traffic flow if light rail crossings were made at-grade or were grade separated. VISSIM results for intersections inside the North Tryon Street/US-29 corridor, between Sugar Creek Road and the I-485 Outer Ramp can be found in the *Traffic Analysis Report, November 2009*.

Figures 3-6a through 3-6c depict vehicular movements at intersections and at-grade crossings. Table 3-25 summarizes the intersection operations for the No-Build Alternative and proposed Light Rail Alternative. Additionally, Table 3-26 summarizes the intersection operations for the Light Rail Alternative – Sugar Creek Design Option.

Table 3-25
No-Build and Light Rail Alternatives, Delay and Level of Service by Intersection, 2030

Intersection	No-Build Alternative					Light Rail Alternative				
	Signalized (S) Unsignalized (U)	Delay (sec.)		LOS		Signalized (S) Unsignalized (U)	Delay (sec.)		LOS	
		a.m.	p.m.	a.m.	p.m.		a.m.	p.m.	a.m.	p.m.
12th Street & College Street	S	9.7	14.7	A	B	S	9.8	14.7	A	B
16th Street & Parkwood Avenue	U	41.9	25.9	E	D	U	41.9	25.9	E	D
Brevard Street & Parkwood Avenue	U	26.6	13.4	D	B	U	26.6	13.4	D	B
28th Street & Brevard Street	U	10.9	10.3	B	B	U	10.9	10.3	B	B
36th Street & North Davidson Street	S	8.8	11.1	A	B	S	9.0	11.0	A	B
Craighead Road & Raleigh Street	U	14.5	13.5	B	B	U	14.5	13.5	B	B
Craighead Road & North Davidson Street	U	20.5	30.1	C	D	U	21.1	37.2	C	E
Sugar Creek Road & North Davidson Street	U	85.6	Note 2	F	F	S	11.9	23.4	B	C
Sugar Creek Road & Raleigh Street (southern intersection)	U	26.2	37.3	D	E	U	69.1	116.9	E	F
Sugar Creek Road & Raleigh Street (northern intersection)	U	20.4	32.1	C	D	U	1.0	91.1	A	F
Sugar Creek Road & Greensboro	S	7.9	9.5	A	A	S	3.4	13.9	A	B
North Tryon Street/US-29 & Sugar Creek Road	S	78.0	122.6	E	F	S	93.1	138.6	F	F
North Tryon Street/US-29 & Beechway Circle	U	7.0	110.2	A	F	U	6.1	117.8	A	F
North Tryon Street/US-29 & Wellingford Street	U	21.5	37.5	C	E	U	19.2	192.7	C	F
North Tryon Street/US-29 & Dorton Street	U	15.2	62.8	C	F	U	18.4	40.6	C	E
North Tryon Street/US-29 & Mellow Drive	U	16.9	55.5	C	F	U	14.4	43.8	B	E
North Tryon Street/US-29 & Bennett Street	U	182.5	63.4	F	F	U	35.1	48.9	E	E
North Tryon Street/US-29 & Bingham Drive	U	32.5	80.8	D	F	U	20.5	155.1	C	F
North Tryon Street/US-29 & Lambeth Drive	U	30.8	67.8	D	F	U	35.8	151.5	E	F
North Tryon Street/US-29 & Eastway Drive	S	37.7	95.7	D	F	S	25.7	116.5	C	F
Eastway Drive & Northpark Mall Driveway #1	U	11.3	10.7	B	B	U	11.7	11.2	B	B

Table 3-25 (continued)
No-Build and Light Rail Alternatives, Delay and Level of Service by Intersection, 2030

Intersection	No-Build Alternative					Light Rail Alternative				
	Signalized (S) Unsignalized (U)	Delay (seconds)		LOS		Signalized (S) Unsignalized (U)	Delay (seconds)		LOS	
		a.m.	p.m.	a.m.	p.m.		a.m.	p.m.	a.m.	p.m.
Eastway Drive & Northpark Mall Driveway #2	S	3.3	7.4	A	A	S	2.8	7.6	A	A
Eastway Drive & Curtiswood Drive	U	15.0	27.1	B	D	U	15.2	28.8	C	D
North Tryon Street/US-29 & Northchase Drive	U	23.8	14.2	C	B	U	14.5	58.0	B	F
North Tryon Street/US-29 & Old Concord Road Station Access	-	-	-	-	-	U	Note 1	10.8	A	B
North Tryon Street/US-29 & Old Concord Road	S	54.4	22.8	D	C	S ^{##}	64.2	45.1	E	D
Old Concord Road & Old Concord Road Station Access	-	-	-	-	-	U	9.2	41.6	A	E
Old Concord Road & Orr Road	S	62.0	37.5	E	D	S	50.0	30.7	D	C
North Tryon Street/US-29 & Orr Road	S@	57.5	27.2	E	C	S	75.1	41.1	E	D
North Tryon Street/US-29 & Austin Drive	U	65.3	64.0	F	F	U	26.2	34.3	D	D
North Tryon Street/US-29 & Arrowhead Drive	S@	27.1	17.3	C	B	S	40.0	32.6	D	C
North Tryon Street/US-29 & Heathway Drive	U	22.3	41.5	C	E	U	9.4	48.7	A	E
North Tryon Street/US-29 & Owen Boulevard	U	10.0	38.0	B	E	S	20.7	17.6	C	B
North Tryon Street/US-29 & Tom Hunter Road	S	18.6	128.0	B	F	S	33.6	140.9	C	F
North Tryon Street/US-29 & Gloryland Avenue	U	Note 1	238.2	A	F	U	Note 1	560.5	A	F
North Tryon Street/US-29 & Orchard Trace Lane	U	25.4	134.7	D	F	S	14.7	95.4	B	F
North Tryon Street/US-29 & Kemp Street	U	31.7	46.0	D	E	U	25.8	1295.7	D	F
North Tryon Street/US-29 & I-85 Connector	S	40.8	189.1	D	F	S ^{##}	58.5	216.3	E	F
North Tryon Street/US-29 & I-85 Service Road	U	Note 1	19.3	A	C	U	Note 1	9.4	A	A
North Tryon Street/US-29 & University City Blvd. Station Access [#]	-	-	-	-	-	S	24.3	39.1	C	D

Table 3-25 (continued)
No-Build and Light Rail Alternatives, Delay and Level of Service by Intersection, 2030

Intersection	No-Build Alternative					Light Rail Alternative				
	Signalized (S) Unsignalized (U)	Delay (seconds)		LOS		Signalized (S) Unsignalized (U)	Delay (seconds)		LOS	
		a.m.	p.m.	a.m.	p.m.		a.m.	p.m.	a.m.	p.m.
North Tryon Street/US-29 & Stetson Drive	U	47.8	20.0	E	C	U	8.2	4.1	A	A
North Tryon Street/US-29 & Rocky River Road	U	16.1	16.8	C	C	U	11.7	11.4	B	B
North Tryon Street/US-29 & University City Blvd./NC-49	S	125.3	160.4	F	F	S ^{##}	119.9	160.4	F	F
North Tryon Street/US-29 & Brookside Lane	U	47.3	59.7	E	F	U	34.8	314.6	D	F
North Tryon Street/US-29 & Shopping Center Drive	S	39.0	53.0	D	D	S	87.0	84.1	F	F
North Tryon Street/US-29 & Clark Boulevard	U	22.5	19.3	C	C	U	68.3	34.4	F	D
North Tryon Street/US-29 & Hampton Church Road	U	11.9	16.8	B	C	U	7.9	8.8	A	A
North Tryon Street/US-29 & McCullough Drive	S	17.3	37.0	B	D	S	24.9	34.8	C	C
North Tryon Street/US-29 & Ken Hoffman Drive	S	16.4	12.3	B	B	S	20.9	22.3	C	C
North Tryon Street/US-29 & W.T. Harris Boulevard	S	51.9	136.2	D	F	S ^{##}	66.1	148.0	E	F
North Tryon Street/US-29 & JM Keynes Drive	S	12.5	39.7	B	D	S	28.3	52.5	C	D
North Tryon Street/US-29 & JW Clay Boulevard	S	16.8	52.1	B	D	S	23.0	79.7	C	E
North Tryon Street/US-29 & UNC Charlotte Research Drive	S	14.4	26.5	B	C	S	24.3	33.0	C	C
North Tryon Street/US-29 & Grove Lake Drive	U	9.0	12.0	A	B	U	7.0	10.5	A	B
North Tryon Street/US-29 & Barton Creek Drive	U	28.8	8.9	D	A	U	9.8	8.3	A	A
North Tryon Street/US-29 & Mallard Creek Church Road	S	89.9	136.1	F	F	S	52.4	140.0	D	F
Mallard Creek Church Road & Stone Quarry Road	U	Note 1	Note 1	A	A	U	0.2	1.3	A	A
North Tryon Street/US-29 & US-29 Access	U	42.7	16.8	E	C	U	38.1	25.6	E	D

Table 3-25 (continued)
No-Build and Light Rail Alternatives, Delay and Level of Service by Intersection, 2030

Intersection	No-Build Alternative					Light Rail Alternative				
	Signalized (S) Unsignalized (U)	Delay (seconds)		LOS		Signalized (S) Unsignalized (U)	Delay (seconds)		LOS	
		a.m.	p.m.	a.m.	p.m.		a.m.	p.m.	a.m.	p.m.
North Tryon Street/US-29 & Morning Star Place Dr (I-485 Station Entrance)	U	21.0	26.9	C	D	S ^{##}	11.6	70.1	B	E
North Tryon Street/US-29 & I-485 Station Access (right-in/right-out)	-	-	-	-	-	U	Note 1	16.8	A	C
North Tryon Street/US-29 & I-485 Inner Ramp	S	16.9	17.4	B	B	S	31.6	85.3	C	F
North Tryon Street/US-29 & I-485 Outer Ramp	S	50.7	14.2	D	B	S	123.1	23.6	F	C

Source: LYNX Blue Line Extension Northeast Corridor Light Rail Project; Traffic Analysis Report 2009

[@] Note: Intersection is anticipated to be signalized by 2030

[#]Note: Intersection becomes signalized in the 2030 Light Rail Alternative

^{##}Note: Assumes the light rail alignment is grade separated over the intersection

Note 1: Nominal amount of traffic on the side street approach

Note 2: The delay is too large for Synchro to provide a value

Table 3-26
Light Rail Alternative – Sugar Creek Design Option
Delay and Level of Service by Intersection, 2030

Intersection	2030 Light Rail Alternative – Sugar Creek Design Option				
	Signalized (S) Unsignalized (U)	Delay (seconds)		LOS	
		a.m.	p.m.	a.m.	p.m.
16th Street & Parkwood Avenue	U	41.9	25.9	E	D
Brevard Street & Parkwood Avenue	U	26.6	13.4	D	B
28th Street & Brevard Street	U	10.9	10.3	B	B
Craighead Road & Raleigh Street	U	14.5	13.5	B	B
Craighead Road & North Davidson Street	U	21.0	37.9	C	E
Sugar Creek Road & North Davidson Street	S	13.1	27.4	B	C
Sugar Creek Road & Raleigh Street (southern intersection)	U	25.8	25.5	D	D
Sugar Creek Road & Raleigh Street (northern intersection)	U	22.0	304.2	C	F
North Tryon Street/US-29 & Beechway Circle	U	6.9	106.5	A	F
North Tryon Street/US-29 & Wellingford Street	U	15.3	44.5	C	E
North Tryon Street/US-29 & Dorton Street	S	5.1	85.5	A	F
North Tryon Street/US-29 & Mellow Drive	U	9.5	8.3	A	A
North Tryon Street/US-29 & Bennett Street	U	10.2	8.7	B	A
North Tryon Street/US-29 & Bingham Drive	U	10.6	22.7	B	C
North Tryon Street/US-29 & Lambeth Drive	S	16.7	79.9	B	E
Eastway Drive & Curtiswood Drive	U	15.0	28.4	B	D
Eastway Drive & Northpark Mall Driveway #1	U	11.5	11.1	B	B
North Tryon Street/US-29 & Northchase Drive	U	15.6	557.5	C	F
North Tryon Street/US-29 & Old Concord Road Station Access	U	Note 1	13.0	A	B
Old Concord Road & Old Concord Road Station Access	U	9.2	40.9	A	E
North Tryon Street/US-29 & Austin Drive	U	69.8	32.9	F	D
North Tryon Street/US-29 & Heathway Drive	U	9.9	8.3	A	A

Note 1: Nominal amount of traffic on the side street approach

Source: LYNX Blue Line Extension Northeast Corridor Light Rail Project; Traffic Analysis Report 2009

Sugar Creek Park-and-Ride Option 2

A parking garage is proposed at the Sugar Creek Station under the Sugar Creek Park-and-Ride Option 2, which includes approximately 1,010 parking spaces. As described previously, a signal would be added at the intersection of N. Davidson Street and Sugar Creek Road. An addendum to the *Traffic Analysis Report* was created to detail the traffic impacts associated with the proposed parking garage. Table 3-27 details the LOS and delay results, utilizing SYNCHRO software, for intersections affected by vehicular trips accessing the parking garage under the Sugar Creek Park-and-Ride Option 2.

Table 3-27
Light Rail Alternative (Sugar Creek Park-and-Ride Option 2)
Delay and Level of Service by Intersection, 2030

Intersection	2030 Light Rail Alternative – Sugar Park-and-Ride Option 2				
	Signalized (S) Unsignalized (U)	Delay (seconds)		LOS	
		a.m.	p.m.	a.m.	p.m.
North Davidson & 36th Street	S	8.8	9.7	A	A
Craighead Road & Raleigh Street	U	8.4	8.4	A	A
Craighead Road & North Davidson Street	U	10.6	10.6	B	B
Sugar Creek Road & The Plaza	S	71.8	59.1	E	E
Sugar Creek Road & Atmore Street	U	15.3	11.8	C	B
Sugar Creek Road & North Davidson Street	S	17.7	29.0	B	C
Sugar Creek Road & Raleigh Street (southern intersection)	U	23.3	26.9	C	D
Sugar Creek Road & Raleigh Street (northern intersection)	U	41.5	24.9	E	C
Sugar Creek Road & Greensboro Street	S	3.6	6.8	A	A
North Tryon Street/US-29 & Sugar Creek Road	S	90.2	65.4	F	E

Source: LYNX Blue Line Extension Northeast Corridor Light Rail Project; Traffic Analysis Report Addendum 2010

Intersection Operations

The operations at most unsignalized intersections along North Tryon Street/US-29 would improve as a result of the proposed Light Rail Alternative. Left turn access across the median and light rail tracks would not be permitted and the unsignalized intersections would be right-in/right-out, which would improve the ease of access to North Tryon Street/US-29. There are a few unsignalized intersections that would not improve or would experience a decreased LOS. These intersections are adjacent to congested signalized intersections that produce queues that would back up through the unsignalized intersection, which would limit gaps for the side street traffic to enter North Tryon Street/US-29.

Of the unsignalized intersections beyond the limits of North Tryon Street/US-29, only one would experience a decrease from a LOS D or better to a LOS E or LOS F. This would be at Raleigh Street and Sugar Creek Road where the proposed project would realign Raleigh Street to form a single four-leg intersection under the Sugar Creek Station Park-and-Ride Option 1. Raleigh Street would not be realigned under the Sugar Creek Station Park-and-Ride Option 2. The realigned intersection, along with two new driveways on Sugar Creek Road, would provide vehicular access to the Sugar Creek Station Park-and-Ride. Delays would occur during the p.m. peak hour on the Raleigh Street approaches to the realigned intersection due to vehicles exiting the park-and-ride facilities. The proximity of existing and planned signalized intersections may preclude a traffic signal at the Raleigh Street and Sugar Creek Road intersection. A traffic signal at this location would be investigated further if the Sugar Creek Station Park-and-Ride Option 1 is selected.

There would be decreases in the LOS and increases in delay at several signalized intersections along North Tryon Street/US-29 as the result of the construction of the proposed Light Rail Alternative. Five intersections would operate at a LOS E or LOS F in the No-Build scenario and would experience an increase in delay with the proposed Light Rail Alternative; these would include the Sugar Creek Road, Eastway Drive, Orr Road, Tom Hunter Road and Mallard Creek Church Road intersections.

Eight signalized intersections along North Tryon Street/US-29 would decrease from a LOS D under the No-Build Alternative to a LOS E or LOS F with the proposed Light Rail Alternative as follows:

- The light rail would be grade-separated at four of these intersections; Old Concord Road, I-85 Connector, W.T. Harris Boulevard and Morningstar Place Drive (I-485/N. Tryon Station Access). While congestion would increase at these signalized intersections as a result of the additional traffic going to the nearby park-and-ride facilities, the grade separated light rail operation itself would not affect these signalized intersections.
- The light rail would be at-grade through two of these signalized intersections; Shopping Center Drive and JW Clay Boulevard. These at-grade signalized intersections would experience an increase in delay on the side street approaches because of the light rail preemption. Heavy left turning movements at the North Tryon Street/US-29 and Shopping Center Drive intersection are accommodated by dual left turn lanes which would be retained. The intersection of North Tryon Street/US-29 and JW Clay Boulevard would be located at a light rail station. Vehicular traffic demand would be balanced against the need for safe pedestrian access to the proposed station at this location by replacing the existing northbound dual left turn lane with a single left.
- The two signalized intersections with North Tryon Street/US-29 and the I-485 ramps would see an increase in congestion as a result of the additional traffic going to the I-485/N. Tryon Station. Additional turn lanes would be added to increase the capacity of these signalized intersections.

Subsequent to the development of this analysis, an NCDOT project (STIP I-3803) has been identified to widen approximately 13 miles of I-85 from US-29/NC-49 in Mecklenburg County to NC 73 in Cabarrus County. This analysis does not include the I-85 widening project which could benefit travel along North Tryon Street/US-29 by diverting inter-county traffic from North Tryon Street/US-29 to I-85, thereby relieving some of the congestion at the intersections.

Pedestrian and Bicycle Level of Service

Level of Service was also calculated for the bicycle and pedestrian facilities at signalized intersections using the Bicycle/Pedestrian LOS methodology developed by CDOT. This methodology assesses the important design features at signalized intersections that affect pedestrian and bicyclist comfort and safety when crossing streets. The methodology is used by CDOT as a diagnostic tool and its results are compared with those for traffic LOS in order to select design and operational features that can provide acceptable levels of service for pedestrians and bicyclists. This analysis was used to design intersections for the Light Rail Alternative that are safe for pedestrians and bicyclists, including pedestrian refuges and pedestrian signal timing. The detailed results of the pedestrian and bicycle LOS analysis can be found in the *Traffic Analysis Report, November 2009*.

Light Rail Grade Crossing Analysis

The Light Rail Alternative would operate in two main environments; the railroad right-of-way and the North Tryon Street/US-29 median. The proposed alignment would cross numerous side streets in both areas. Two options exist when the light rail traverses a side street or crosses traffic to enter/exit a highway median. One option is to grade separate the crossing and the other option is to keep the crossing at-grade. An at-grade crossing would position the light rail tracks at the same elevation as the existing roadway and vehicular crossings of the light rail line would be controlled by traffic lights and gates. A grade separated crossing would construct the light rail above or below the existing roadway so that the light rail and vehicular traffic do not impede one another.

The proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option proposes five rail-roadway grade separations along North Tryon Street/US-29: light rail entrance into the North Tryon Street/US-29 median, I-85 Connector, University City Blvd/NC-49, W.T. Harris Boulevard and light rail exit from the North Tryon Street/US-29 median. Delay along the corridor decreases for most signalized intersections with the grade separated configurations. The midblock light rail crossing of Mallard Creek Church Road was evaluated; however, data provided in the *Traffic Analysis Report, November 2009* indicated that this crossing would operate efficiently as an at-grade facility without significantly affecting the performance of the adjacent roadway systems.

Recommendations for grade separated and at-grade crossings were based on safety, traffic volumes, transit headways, arterial travel speeds, cost, intersection delays and traffic spillback to adjacent intersections. As a result of the traffic impacts identified through this analysis, major intersections as well as the light rail entry into and exit from the North Tryon Street/US-29 median would be grade separated.

All other crossings would be at-grade. While the at-grade crossings would experience increased delays on side streets and left turn crossings of the light rail line, the proposed project would use advanced traffic control strategies to manage these impacts. Table 3-28 provides a summary of the rail crossing recommendations for the proposed Light Rail Alternative. Table 3-29 lists the recommendations for the Light Rail Alternative – Sugar Creek Design Option.

Table 3-28
Light Rail Alternative Rail Crossing Summary

Street	Crossing	Recommendation	Traffic Control
7th Street	midblock	at-grade	gates and flashers
8th Street	midblock	at-grade	gates and flashers
9th Street	midblock	at-grade	gates and flashers
10th Street (proposed)	midblock	at-grade	gates and flashers
11th Street	midblock	existing grade separation	none
I-277	interstate	existing grade separation	none
12th Street	midblock	at-grade	gates and flashers
CSX Railroad	railroad	grade separate	none
16th Street	midblock	at-grade	gates and flashers
Entrance to Vehicle Light Maintenance Facility/ NCRP property	midblock	at-grade	gates and flashers
30th Street	midblock	existing grade separation	none
Duke Energy Access Road (proposed)	midblock	grade separate	none
AC&W Railroad	railroad	grade separate	none
36th Street	midblock	grade separate	none
East Craighead Road	midblock	grade separate	none
Sugar Creek Road	midblock	grade separate	none
Eastway Drive	midblock	Existing grade separation	none
Old Concord Road Station Park-and-Ride Access Road	midblock	at-grade	gates and flashers
North Tryon Street/US-29 median entrance	intersection/ median entrance	grade separate	signal
Orr Road	intersection	at-grade	signal, gates and flashers
Arrowhead Drive	intersection	at-grade	signal, gates and flashers
Owen Boulevard	intersection	at-grade	signal, gates and flashers
Tom Hunter Road	intersection	at-grade	signal, gates and flashers
Orchard Trace Lane	intersection	at-grade	signal, gates and flashers
I-85 Connector	intersection	grade separate	
University City Blvd. Station Access Road	intersection	at-grade	signal, gates and flashers
University City Blvd./NC-49	intersection	grade separate	signal
Shopping Center Drive	intersection	at-grade	signal, gates and flashers
McCullough Drive	intersection	at-grade	signal, gates and flashers
Ken Hoffman Drive	intersection	at-grade	signal, gates and flashers
W.T. Harris Boulevard	intersection	grade separate	signal
JM Keynes Drive	intersection	at-grade	signal, gates and flashers
JW Clay Boulevard	intersection	at-grade	signal, gates and flashers
UNCC Research Drive	intersection	at-grade	signal, gates and flashers
North Tryon Street/US-29 median exit	midblock/median exit	grade separate	none
UNC Charlotte Parking Lot Entrance	midblock	at-grade	gates and flashers
Mallard Creek Church Road ¹	midblock	at-grade	gates and flashers
Morningstar Place Drive	intersection	grade separate	signal, gates and flashers

Source: *Traffic Analysis Report*, 2009. Based on 2008 counts.

¹Additional analysis needed to confirm this recommendation.

Table 3-29
Light Rail Alternative – Sugar Creek Design Option Rail Crossing Summary

Street	Crossing	Recommendation	Traffic Control
Dorton Street	intersection	at-grade	signal, gates and flashers
Lambeth Drive	intersection	at-grade	signal, gates and flashers

Parking

Parking facilities outside of Center City Charlotte under the No-Build Alternative would continue to consist of on-street parking or commercial shopping center parking lots. For the proposed Light Rail Alternative, park-and-ride lots would be constructed at seven station locations. The locations and the total number of provided parking spaces are detailed in Chapter 2.0: Alternatives Considered – Table 2-6: Proposed Stations for the Light Rail Alternative. The Light Rail alignment would traverse through the median of North Tryon Street/US-29 and roadway widening would be required. As a result, potential impacts would occur to existing private parking facilities along North Tryon Street/US-29. The civil design plans depict that approximately 33 parcels would have their existing parking reduced to some degree. Overall, approximately 379 parking spaces would be affected. Many of these parcels have additional space that could be used for relocating the affected parking spaces. Overall, a majority of the existing properties parking supply along the corridor would not be affected due to efforts in constructing retaining walls along the edge of the proposed right-of-way limits.

For the Light Rail Alternative – Sugar Creek Design Option, transit only park-and-ride lots would also be constructed at seven locations. Two of those locations would be different than the proposed Light Rail Alternative, while the remaining five locations would be identical to the proposed Light Rail Alternative. The locations and the total number of provided parking spaces are detailed in Chapter 2.0: Alternatives Considered - Table 2-7: Proposed Stations for the Sugar Creek Design Option.

3.2.2.3 Effects on Other Transportation Facilities and Services

Freight Railroads

Under the No-Build Alternative, existing freight rail service would continue to operate in its current location. Recent trends shows that freight rail service would continue to increase due to the higher costs of vehicular fuel.

Under the proposed Light Rail Alternative, separate tracks would be built for light rail and the light rail would not cross the existing freight rail tracks at-grade. Therefore, freight service operations would not be altered and potential rail conflicts would be minimized. The proposed project does include relocating existing freight tracks from approximately 30th Street to Craighead Road to make room for the proposed light rail alignment. The grade separation will provide both operational and safety benefits for freight railroads by separating railroad movements from auto, bicycle and pedestrian movements. Tracks would be constructed to be used temporarily by the freight/passenger rail operators during the construction of the proposed Light Rail Alternative in order to avoid any construction-related impacts (See Chapter 18.0: Construction). The light rail tracks would cross over existing freight tracks on a grade separated structure near Craighead Street. Whenever the light rail tracks are at-grade with the freight tracks, a 54 foot separation would be maintained between the tracks at all times.

Separate from the proposed project, there are two different freight projects that are in either the planning or design phase. The first one is the relocation of the existing NS Intermodal Yard to the Charlotte-Douglas International Airport. It is anticipated that within the next two years, the intermodal yard will be relocated to the airport to provide quick and easy transfers from air cargo to freight. The second project is being coordinated by NCDOT and NCR, in which Sugar Creek Road would be depressed allowing for a new grade separated crossing. The existing freight tracks would not change in elevation, Sugar Creek Road would go under the existing tracks.

Passenger Railroads

Under the No-Build Alternative, the existing passenger rail service would operate as it currently does. As mentioned in Section 3.1.4, future passenger rail service accommodating higher speeds is planned to

utilize the corridor, which would require additional tracks to be constructed. The proposed high speed rail service would be a separate alignment and would not share tracks with freight service.

Amtrak and NCDOT Rail utilize the existing freight tracks within the corridor for passenger rail service. For the proposed Light Rail Alternative, the same conditions would apply as with the freight rail. There would be no conflicts between passenger rail and the light rail service, as well as with future high speed rail. Tracks would be constructed to be used temporarily by the freight/passenger rail operators during the construction of the proposed Light Rail Alternative in order to avoid any construction-related impacts (See Chapter 18.0: Construction).

Bikeways and Major Pedestrian Ways

No changes to bikeways or major pedestrian ways would occur beyond those described in Section 3.1.5, as a result of the No-Build Alternative. For the proposed Light Rail Alternative, bicycle parking would be provided at each station by use of either bicycle lockers and/or lockable stands. Bicycles would also be allowed to be placed in a bike holder in each light rail vehicle or carried into the vehicle. Each bike holder inside the vehicle would have the capability to hold up to two bikes. Multi-use paths, for pedestrian and wheelchair accessibility, would be constructed leading up to all station areas. Existing pedestrian and bicycle facilities would be enhanced under the proposed Light Rail Alternative. The proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option propose multi-use paths, bicycle lanes, median refuge areas for pedestrians and vehicular speed reductions along North Tryon Street/US-29. These enhancements markedly improve the pedestrian and bicycle environment and LOS.

As part of the station area planning process, specific pedestrian and bicycle improvements will be identified. The City of Charlotte will identify improvements beyond direct station access as part of a separate program called the Northeast Corridor Infrastructure (NECI) Program. NECI is similar to the City of Charlotte's South Corridor Infrastructure Program (SCIP), where pedestrian, bicycle and other infrastructure improvements were identified and constructed after the decision to implement light rail in the corridor was made. These additional improvements would not be funded as part of the proposed Light Rail Alternative.

3.3 Mitigation

3.3.1 No-Build Alternative

Mitigation is not required for the No-Build Alternative.

3.3.2 Light Rail Alternative

The following corridor-level design changes, as recommended in the *Traffic Analysis Report*, and *Traffic Analysis Report Addendum* have been made and are included in the *30% Preliminary Engineering Design Plans*. Analysis results of these changes, which address both motorized and non-motorized forms of transportation, are shown in Tables 3-23 through 3-26.

- *Sugar Creek Road & North Davidson Street* – Install a traffic signal at this intersection. For Sugar Creek Park-and-Ride Option 2, this intersection will still be signalized and two lanes (one in each direction) will be added to North Davidson Street. An additional southbound lane will become a drop right turn lane into the proposed parking garage entrance. The additional northbound lane will accommodate a left and right turn lane onto Sugar Creek Road. An eastbound right turn lane and a westbound left turn lane will also be added to Sugar Creek Road at the intersection with North Davidson Street.
- *North Tryon Street/US-29 & Old Concord Road* – Provide exclusive dual left turn lanes and a shared through/right lane for the westbound Old Concord Road approach.
- *North Tryon Street/US-29 & Orr Road* – Provide a second approach lane for Orr Road. This lane can either serve as a through-right lane or as a separate right turn lane. Its use will be determined as the design proceeds. This intersection will be signalized by the proposed project if not installed prior to construction.
- *North Tryon Street/US-29 & Arrowhead Drive* – Remove the existing northbound and southbound right turn lanes on North Tryon Street/US-29. The right turn volume at this intersection is minimal and

the removal of these turn lanes do not adversely affect the level of service at this location. This intersection will be signalized by the proposed project if not installed prior to construction.

- North Tryon Street/US-29 & Owen Boulevard – Install a traffic signal at this intersection and remove the northbound and southbound right turn lanes on North Tryon Street/US-29. Removal of these two lanes does not adversely affect the level of service at this location based on existing and projected volumes.
- North Tryon Street/US-29 & Orchard Trace Lane – Install a traffic signal at this intersection. A second approach lane on Orchard Trace Lane is also recommended. This lane can either serve as a through-right lane or as a separate right turn lane. Its use will be determined as the design process proceeds.
- North Tryon Street/US-29 & University City Blvd. Station Access – Install a traffic signal at this intersection. Provide a northbound left turn lane to access the park-and-ride facility and a southbound left turn lane to permit U-turns. Provide a southbound right turn lane for vehicles accessing the University City Blvd. Station from North Tryon Street/US-29.
- North Tryon Street/US-29 & Shopping Center Drive – Provide dual left turn lanes for the southbound approach of North Tryon Street/US-29.
- North Tryon Street/US-29 & McCullough Drive – Remove one of the dual left turn lanes on the southbound approach of North Tryon Street/US-29. The removal of this turn lane will not negatively impact the level of service for traffic and will in turn provide a shorter crossing distance for transit patrons accessing the station platform. The proposed Light Rail Alternative will also remove the northbound right turn lane on North Tryon Street/US-29. The right turn volume at this intersection is minimal and the removal of this lane does not adversely affect the level of service at this location.
- North Tryon Street/US-29 & JW Clay Boulevard – Remove one of the dual left turn lanes on the northbound approach of North Tryon Street/US-29. The removal of this lane will not significantly impact the level of service for traffic and will in turn improve pedestrian access to the station platform by providing a shorter crossing of the street.
- North Tryon Street/US-29 & Mallard Creek Church Road – Provide a second westbound left turn lane from Mallard Creek Church Road to prevent the traffic queues from extending over the proposed light rail tracks.
- North Tryon Street/US-29 & Morningstar Place Drive (I-485 Station Entrance) – Install a traffic signal at this intersection. Keep the existing northbound North Tryon Street/US-29 right turn lane.
- North Tryon Street/US-29 & I-485 Inner Ramp – Provide a second right turn lane on the eastbound I-485 off-ramp and place the right turn movement under signal control. The additional right turn lane is needed to mitigate long queues on the ramp.
- North Tryon Street/US-29 & I-485 Outer Ramp – Provide a second left turn lane on the westbound I-485 off-ramp. The additional left turn lane is needed to mitigate long queues on the ramp.

To minimize impacts from light rail operations, the proposed Light Rail Alternative and Light Rail Alternative – Sugar Creek Design Option proposes that light rail be grade separated with major intersections. These intersections include I-85 Connector, University City Blvd.NC-49 and W.T. Harris Boulevard. Grade separations are also proposed when the light rail alignment enters and exits the North Tryon Street/US-29 median, and at mid-block crossings of 36th Street, Sugar Creek Road and Eastway Drive.

Access management will be facilitated at the seven park-and-ride locations through the addition of new driveways to provide access to the stations. In some situations, these access points will be either right-in/right-outs or full movement signalized intersections. Pedestrian and bicycle access to the stations will be facilitated by improvements in the station vicinity.

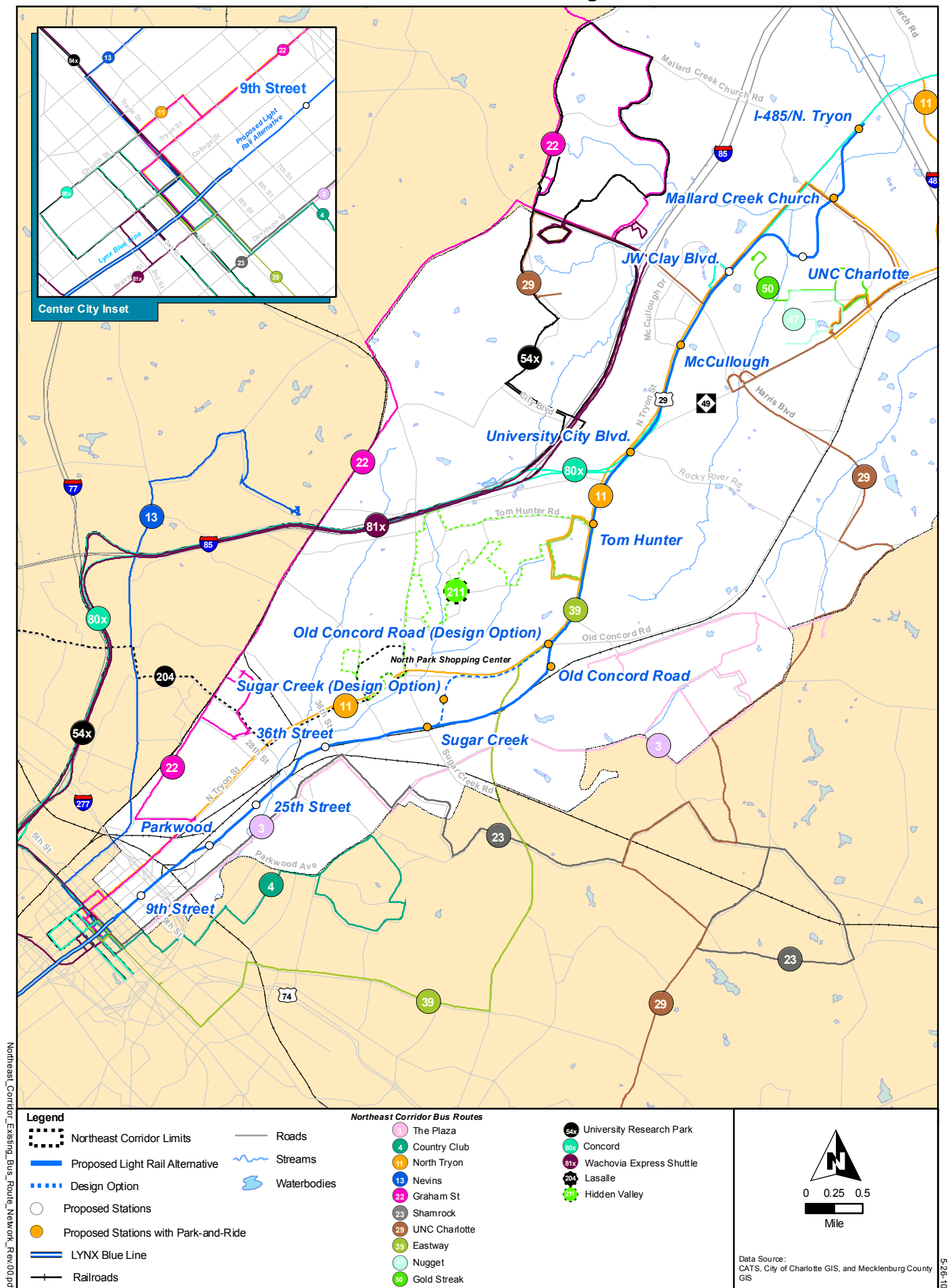
Additional design considerations were included in the 30% *Preliminary Engineering Design Plans* to avoid railroad conflicts with the light rail. The proposed Light Rail Alternative includes a grade separated crossing of the CSX Corporation railroad. In the NCR right-of-way, the light rail project includes grade separations over the NS and AC&W railroads, along with relocating the NS mainline freight tracks to provide space for the light rail alignment.

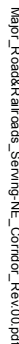
3.3.3 Light Rail Alternative – Sugar Creek Design Option

The following corridor-level design changes, as recommended in the *Traffic Analysis Report*, have been made and are included in the preliminary engineering design plans:

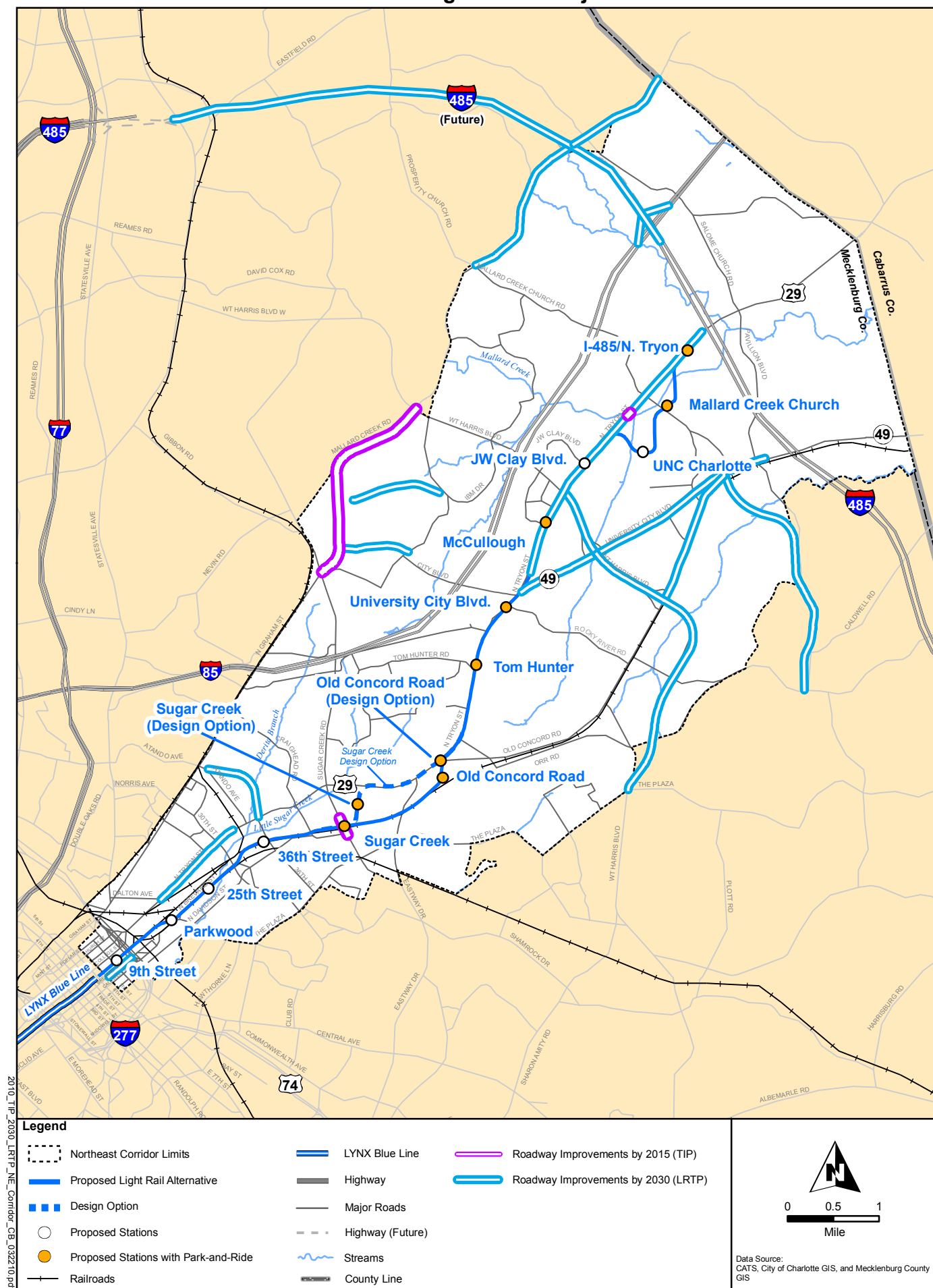
- North Tryon Street/US-29 & Dorton Street – Install a traffic signal at this intersection.
- North Tryon Street/US-29 & Lambeth Drive – Install a traffic signal at this intersection.
- The Light Rail Alternative – Sugar Creek Design Option would include all of the mitigation recommendations for the proposed Light Rail Alternative.

Similar impacts to the proposed Light Rail Alternative would be expected for intersections surrounding light rail stations, under the Light Rail Alternative – Sugar Creek Design Option. Improvements to the existing infrastructure would be required to provide vehicular, bicycle and pedestrian access to the stations, which would include construction of new driveways and turning restrictions for vehicles (i.e. right-in/right-out access).

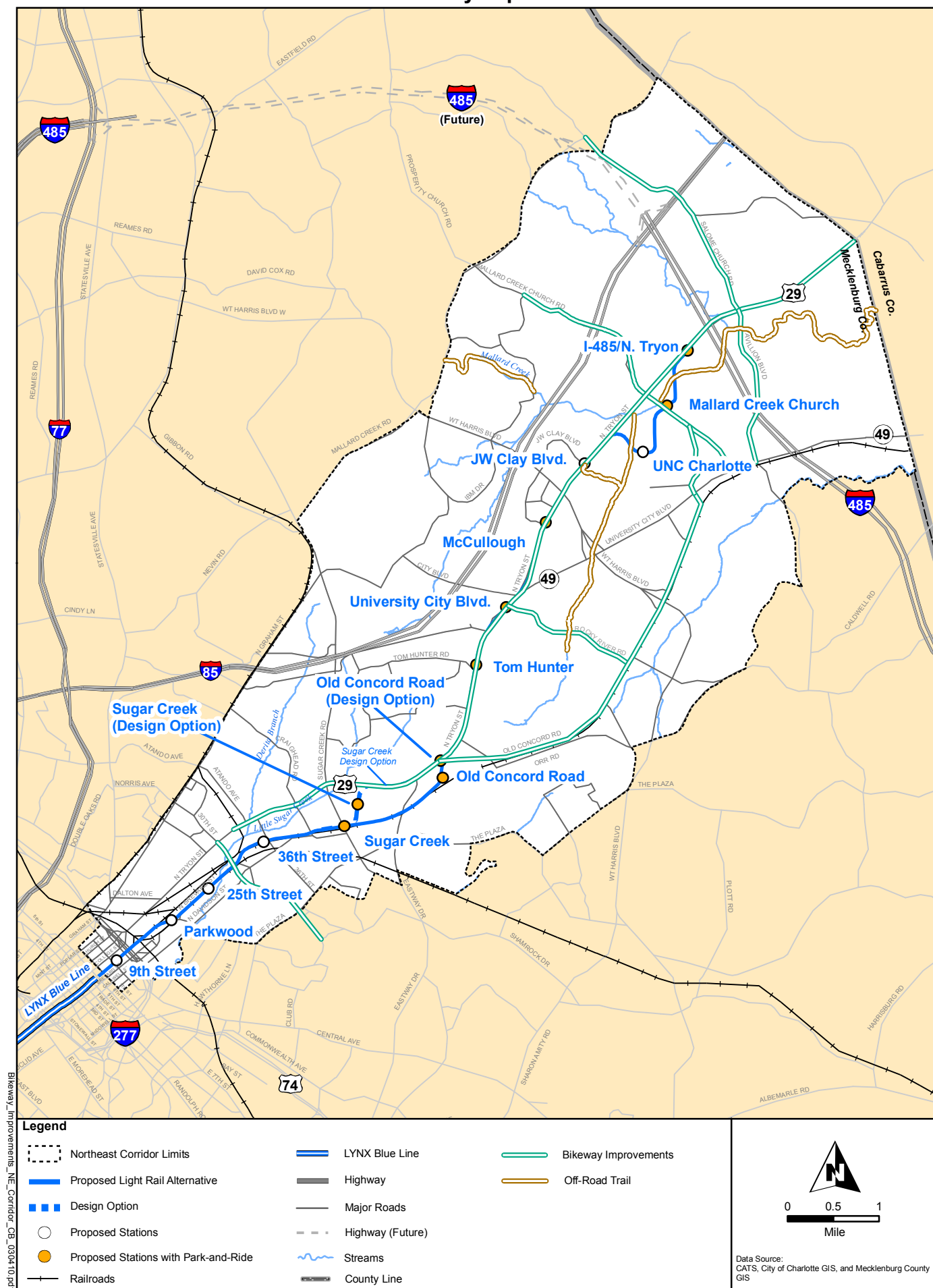




Planned and Programmed Projects within the Northeast Corridor



Bikeway Improvements within the Northeast Corridor



Overall Corridor with Transportation Segments

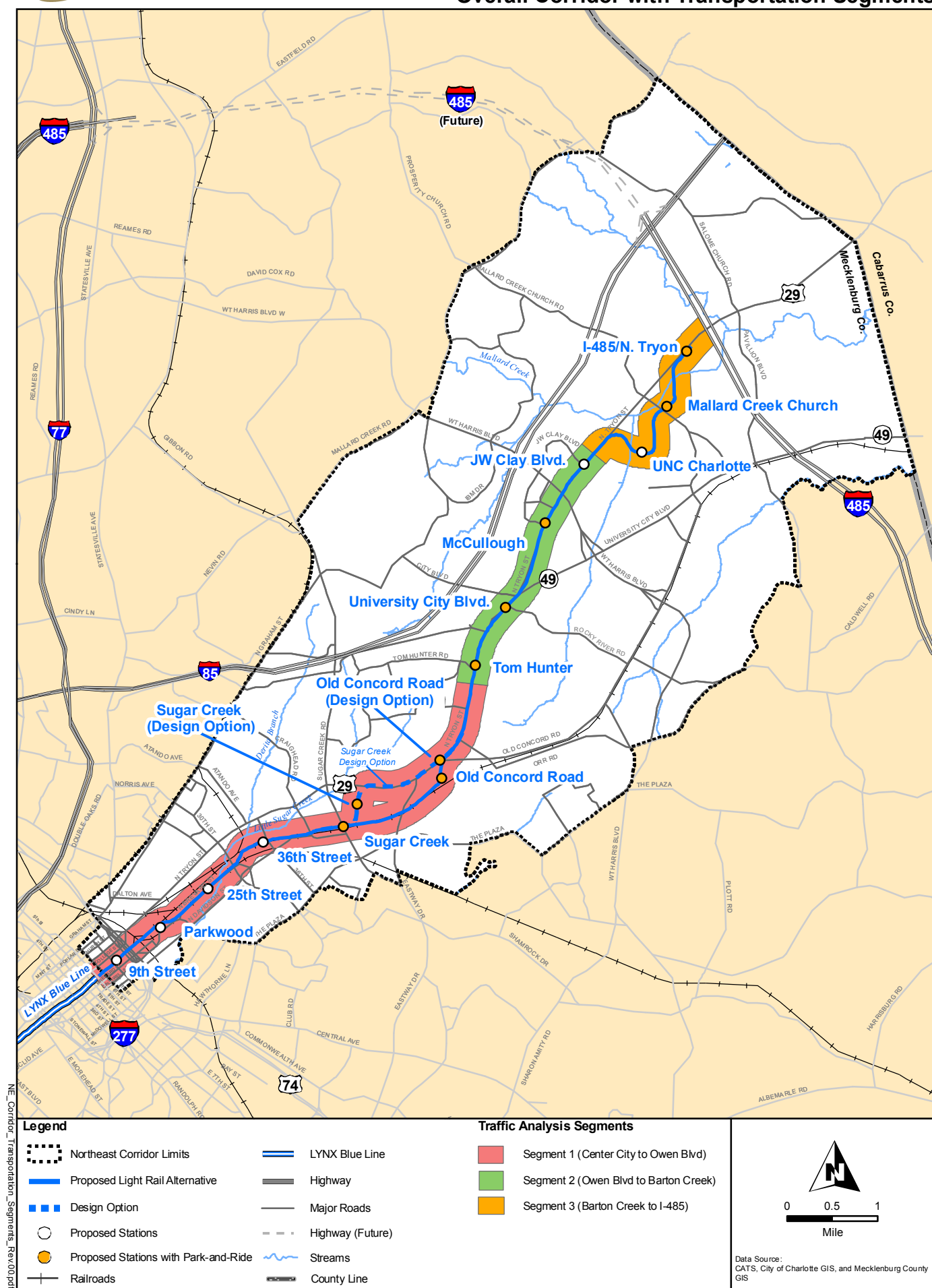


Figure 3-6a
Grade Crossings - 2030 Light Rail Alternative

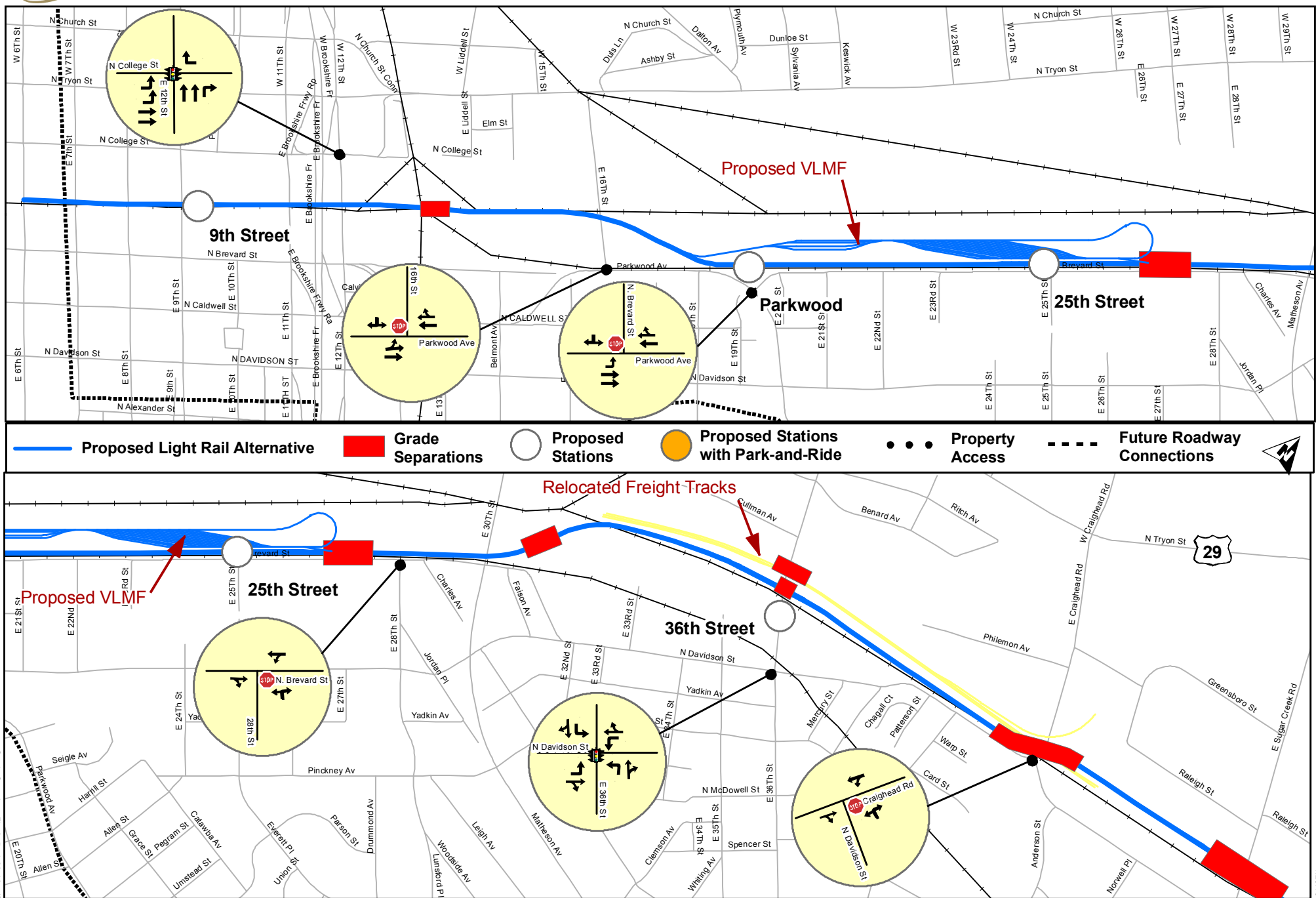
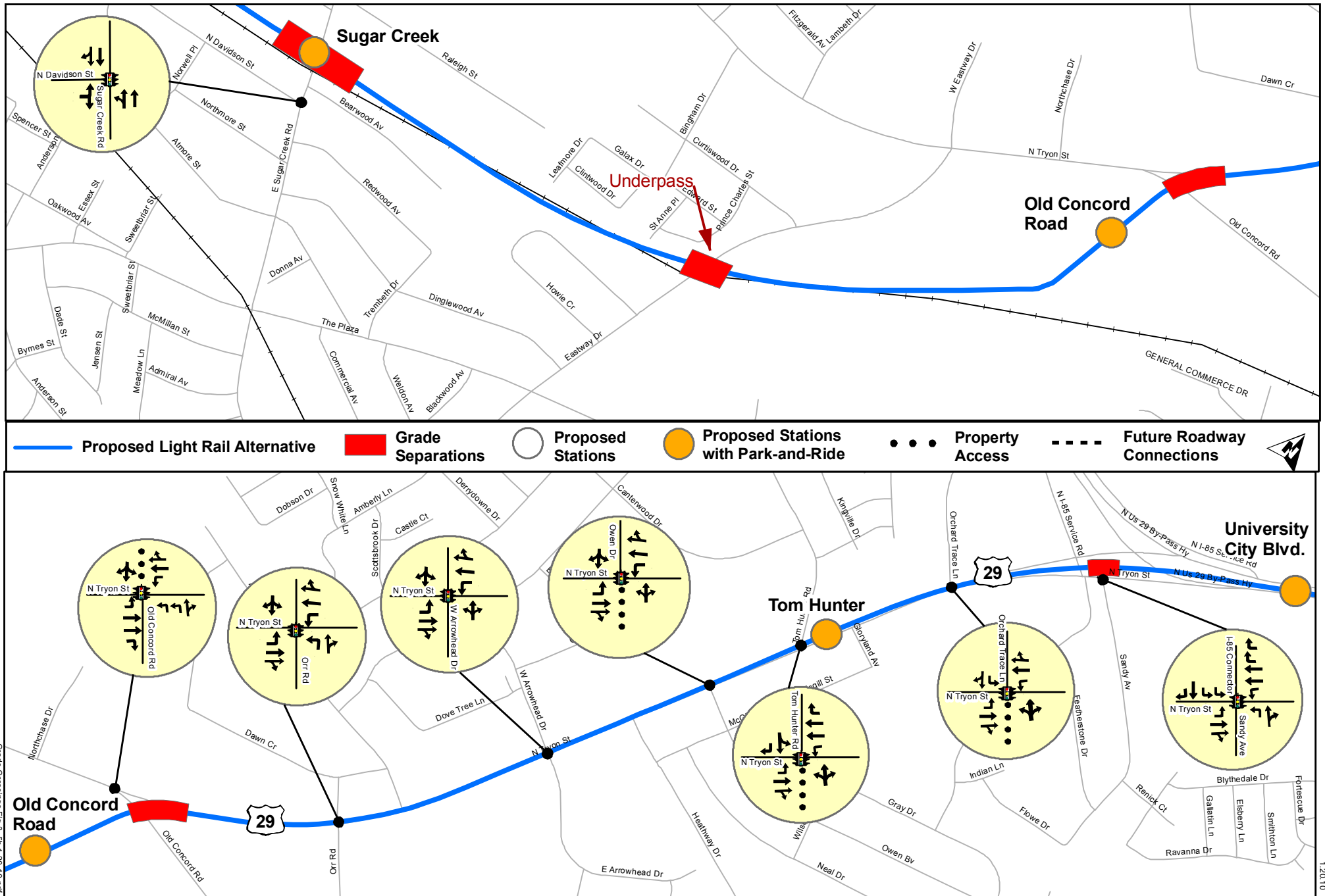


Figure 3-6b
Grade Crossings - 2030 Light Rail Alternative



Grade Crossings - 2030 Light Rail Alternative

